BRITISH COLUMBIA
MINISTRY OF FORESTS

Kamloops Timber Supply Area

Rationale for Allowable Annual Cut (AAC) Determination

Effective January 1, 2003

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Chief Forester

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Objective of this document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed as chief forester of British Columbia in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for the Kamloops Timber Supply Area (TSA). This document also identifies where new or better information is needed for incorporation in future determinations.

Description of the TSA

The Kamloops Timber Supply Area (TSA) is situated in south-central British Columbia and covers approximately 2.67 million hectares (including Wells Gray Provincial Park). The TSA extends from the Logan Lake area south of Kamloops north to Wells Gray Park, and is bounded by the Columbia Mountains to the east and the Cariboo/Chilcotin area to the west. The Kamloops TSA is one of four TSAs in the Kamloops Forest Region, and includes both the Kamloops and Clearwater Forest Districts, with the exception of Tree Farm Licences (TFL) 35 and 18.

The topography of the Kamloops TSA is one of sharp contrasts, from dry, hot grasslands in the south, to wet areas and rugged mountains in the north. The forests of the Kamloops TSA are fairly diverse, reflecting the variety of topography and climate. Within the land base currently considered available for timber harvesting, Douglas-fir and lodgepole pine are the dominant species, but spruce, subalpine fir, cedar, hemlock and hardwoods also occur.

Of the entire TSA, approximately 892 894 hectares are not managed directly by the British Columbia Forest Service (BCFS), including parks such as Wells Gray (comprising 528 000 hectares of the TSA), ecological reserves, private land and Indian reserves. An additional 364 371 hectares are considered non-productive or non-forested and include areas covered by rock, swamp, alpine vegetation and water bodies. Productive Crown forest land managed by the BCFS is about 1 409 110 hectares or approximately 53 percent of the total TSA area. Currently about 74 percent of this forested land base is considered available for harvesting (39 percent of the total TSA land base).

According to the 2001 census, the population of the Kamloops TSA was 101,148, a 1 percent decrease from 1996. Almost 80 percent of the TSA's residents live in the City of Kamloops. Other communities include Ashcroft, Cache Creek, Savona, Chase and Logan Lake in the south, and Avola, Barriere, Blue River, Clearwater, Little Fort and Vavenby in the north.

History of the AAC

In 1981, the AAC was 2 350 000 cubic metres. In 1989, the AAC was increased by 62 280 cubic metres to 2 412 280 cubic metres to account for the transfer of Ainsworth Lumber's harvesting rights and land base from 100 Mile TSA to the Kamloops TSA. In 1994, the AAC was further increased by 4400 cubic metres with the transfer of land area from TFL 35 to the Kamloops TSA for the Small Business Forest Enterprise Program (SBFEP). This AAC was in effect until 1996, when the chief forester determined the AAC

to be 2 679 180 cubic metres, including a partition of 200 000 cubic metres for cedar and hemlock stands and a partition of 86 000 cubic metres for Pulpwood Agreement (PA) 16.

The AAC is currently apportioned by the Minister of Forests as follows:

Apportionment	Conventional m3/yr	Partition m3/yr	Percent (%)
Forest licences — replaceable	1 935 065		72.2
Forest licences — non-replaceable (cedar/hemlock partition)		182 000	6.8
Small Business — all categories	386 544	16 000	15.0
Pulpwood Agreement 16		86 000	3.2
Timber sale licence – replaceable (less than 10 000 m^3/year)	1 813		0.1
Woodlot licences (unallocated)	44 453		1.7
Forest Service Reserve	25 305	2 000	1.0
Total AAC	**2 393 180**	**286 000**	**100.0**

New AAC determination

Effective January 1, 2003, the new AAC for the Kamloops TSA will be 2 682 770 cubic metres per year, including a partition of 200 000 cubic metres per year for cedar and hemlock stands, a partition of 86 000 cubic metres for PA 16, a new partition of 20 000 cubic metres per year for deciduous stands outside the current boundary of PA 16.

This AAC includes 14 870 cubic metres per year attributable to innovative practices and activities within the Adams Lake IFPA area, and excludes woodlot licences issued since the 1996 determination (representing 31 280 cubic metres per year).

This determination will remain in effect until a new AAC is determined under the provisions of the *Forest Act*.

Information sources used in the AAC determination

Information considered in determining the AAC for the Kamloops TSA include the following:

- *Kamloops TSA Data Package and Information Report*, BCFS, November 1998;
- *Kamloops TSA Timber Supply Analysis Report and Public Discussion Paper*, BCFS, July 2001;
- *Kamloops TSA Summary of Public*, BCFS, August 2001;
- *Adams Lake Innovative Forest Practices Agreement – Rationale for Increase in AAC Determination*, Kamloops Forest Region, BCFS, July 31, 2002;
- Letter from the Minister of Forests to the chief forester, dated July 28, 1994, stating the Crown's economic and social objectives for the province;

- Memorandum from the Minister of Forests to the chief forester, dated February 26, 1996, stating the Crown's economic and social objectives for the province regarding visual resources;
- Technical review and evaluation of current operating conditions through comprehensive discussions with staff of the BCFS, including the AAC determination meeting held in Kamloops, December 3 to 5, 2001;
- *Kamloops TSA Rationale for AAC determination*, BCFS, March 12, 1996;
- *Kamloops TSA Timber Supply Analysis*, BCFS, May 1995;
- *Kamloops TSA Socio-Economic Analysis*, BCFS, May 1995;
- Kamloops Land and Resource Management Plan and Amendments to March 31, 1996;
- *Clearwater District Inventory Audit*, BCFS Resources Inventory Branch, 1997.
- *Kamloops District Inventory Audit*, BCFS Resources Inventory Branch, 1995.
- Working Paper 36/1998 -- Site Index Adjustments for Old-Growth Stands Based on Veteran Trees, Nigh, G.D., BCFS Research Branch, 1998.
- Working Paper 37/1998 -- Site Index Adjustments for Old-Growth Stands Based on Paired Plots, Nussbaum, A.F., BCFS Research Branch, 1998.
- *Kamloops Regional Landscape Unit Planning Strategy*, Ministry of Forests, June 1999.
- District policy on the preliminary Biodiversity Emphasis Options (BEOs) and Old Growth Management area (OGMA) management, Clearwater Forest District, November 24, 1997.
- District policy on Wildlife Tree Retention (WTR), Clearwater Forest District, September 2, 1998.
- District policy on the management of OGMAs, Mature Growth Management Areas (MGMAs), caribou and biodiversity dispersal corridors, Clearwater Forest District, August 12, 1999.
- District policy on patch-size distribution management, Clearwater Forest District, August 16, 2000
- District policy on preliminary Landscape Unit (LU) BEOs, OGMA management and Wildlife Tree Patch (WTP) targets, Kamloops Forest District, Oct 28, 1997
- District policy on WTR targets, Kamloops Forest District, Oct 28, 1997
- Letter from the deputy ministers of Forests and Environment, Lands and Parks, dated August 25, 1997, conveying government's objectives for achieving acceptable impacts on timber supply from biodiversity management.
- *Forest Practices Code of British Columbia Act*, consolidated to November 2001;
- *Forest Practices Code of British Columbia Act Regulations and Amendments*, current as of November 2001;
- Forest Practices Code of British Columbia Guidebooks, BCFS and Ministry of Environment, Lands and Parks (MELP);

- *Forest Practices Code Timber Supply Analysis*, 1996;
- *Identified Wildlife Management Strategy*, February 1999;
- *Landscape Unit Planning Guide*, BCFS and MELP, March 1999;
- *Higher Level Plans: Policy and Procedures*, BCFS and MELP, December 1996.
- Provincial Coarse Woody Debris policy, May 3, 2000.
- PA 16 Annual Report: 1994 – 2001, Ainsworth Lumber Co. Ltd., 2001

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis, and the inventory and growth and yield data used as inputs to the analysis, typically form the major body of technical information used in AAC determinations. Timber supply analyses and associated inventory information are concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices.

However, the analytical techniques used to assess timber supply are necessarily simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis due in part to variations in physical, biological and social conditions, although ongoing science-based improvements in the understanding of ecological dynamics will help reduce some of this uncertainty.

Furthermore, technical analytical methods such as computer models cannot incorporate all of the social, cultural and economic factors that are relevant when making forest management decisions. Therefore, technical information and analysis do not necessarily provide complete answers or solutions to forest management problems such as AAC determinations. The information does, however, provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information required to be considered in AAC determinations.

In determining the AAC for the Kamloops TSA, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for TSAs and TFLs. Section 8 is reproduced in full as Appendix 1.

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. In making a large number of determinations for many forest management units over extended periods of time, administrative fairness requires consistency when addressing these changes and associated uncertainties. To make my approach in these matters explicit, I have set out the following body of guiding principles. If in some specific circumstance it is necessary to deviate from these principles, I will provide a detailed reasoning in the considerations that follow.

Two important ways of dealing with uncertainty are:

(i) minimizing risk, in respect of which in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining AACs frequently, in cases where projections of short-term timber supply are not stable to ensure they incorporate current information and knowledge—a principle that has been recognized in the legislated requirement to redetermine these AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires me to take into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect either to factors that could work to increase the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or to factors that could work to reduce the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the *Forest Practices Code of British Columbia Act* and its associated regulations (the Forest Practices Code).

The *Forest Practices Code of British Columbia Regulations* were originally approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995.

Although the Forest Practices Code has been fully implemented since the end of the transition period on June 15, 1997, the timber supply implications of some of its provisions, such as those for landscape-level biodiversity, still remain uncertain, particularly when considered in combination with other factors. In each AAC determination I take this uncertainty into account to the extent possible in context of the best available information.

The eventual timber supply impacts associated with strategic land-use decisions resulting from the various planning processes—the Protected Areas Strategy, Land and Resource Management Planning (LRMP), and other area-based planning processes—are often

discussed in relation to current AAC determinations. Since the outcomes of these planning processes are subject to significant uncertainty before formal approval by government, it has been and continues to be my position that in determining AACs it would be inappropriate to attempt to speculate on the timber supply impacts that will eventually result from land-use decisions not yet taken by government. Thus I do not account for possible impacts of existing or anticipated recommendations made by such planning processes, nor do I attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made a formal land-use decision, it may not always be possible to fully analyze and account for the consequent timber supply impacts in a current AAC determination. In many cases, government's land-use decision must be followed by a number of detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. Nevertheless, the legislated requirement for five-year AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

However, where specific protected areas have been designated by legislation or by order in council, these areas are deducted from the timber harvesting land base and are no longer considered to contribute to the timber supply in AAC determinations.

In the Kamloops TSA, government's approval of the Kamloops Land and Resource Management Plan (KLRMP) in 1995, and decisions on protected areas have clarified many aspects of land and resource use and management. The KLRMP was declared a Higher Level Plan (HLP) under the *Forest Practices Code of B.C. Act* in January 1996. The Kamloops LRMP Monitoring Table, established in March 1996, provides ongoing public involvement in the implementation of the HLP. The implementation of the HLP will provide further certainty regarding resource management in the area.

A number of intensive silviculture activities have been undertaken in the past that have the potential to affect timber supply, particularly in the long term. As with all components of my determinations, I require sound evidence before accounting for the effects of intensive silviculture on possible harvest levels. Nonetheless, I will consider information on the types and extent of planned and implemented practices as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of any timber supply effects of intensive silviculture.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete, but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to redetermine many outdated AACs between 1992 and 1996. In any case, the data and models available today are improved from those available in the past, and will undoubtedly provide for more reliable determinations.

Others have suggested that, in view of data uncertainties, I should immediately reduce some AACs in the interest of caution. However, any AAC determination I make must be the result of applying my judgement to the available information, taking any uncertainties into account. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely on the basis of a response to uncertainty. Nevertheless, in making my determination, I may need to make allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent decisions in the British Columbia Court of Appeal and the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting the Crown's obligations under these decisions. In this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the Kamloops TSA. My determination is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply.

The British Columbia Court of Appeal decided in March 2002 that pending the final determination of the existence of aboriginal rights and title, the Crown has an obligation to consult with First Nations with respect to asserted rights and title in a manner proportional to the strength of the interests. I consider any information brought forward respecting First Nations' interests. In particular I consider information related to actions taken to protect interests, including operational plans that describe forest practices designed to seek to address such First Nations' interests. In this context, I re-iterate that my AAC determination does not prescribe a particular plan of harvesting activity, nor does it involve allocation of the wood supply to any particular party.

If, subsequent to this determination, I become aware of information respecting First Nations interests that would substantially alter the estimate of timber supply underlying my determination, I may revisit my determination.

Overall, in making AAC determinations, I am mindful of the mandate of the Ministry of Forests as set out in Section 4 of the *Ministry of Forests Act* and of my responsibilities under the *Forest Practices Code of British Columbia Act* and the *Forest Act*.

The role of the timber supply analysis

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the timber supply review process.

For each AAC determination for a TSA, a timber supply analysis is carried out using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model (Forest Stand Simulator, or FSSIM), a series of timber supply forecasts is produced, reflecting different starting harvest levels, rates of change over time, and potential trade-offs between short- and long-term harvest levels.

From this range of forecasts, one is chosen which attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the

long-term productivity of forest lands. This is known as the 'base case' forecast, and forms the basis for comparison when assessing the effects of uncertainty on timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast for a TSA is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer simulation used to generate it.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which its predictions of timber supply must be adjusted, if necessary, to more properly reflect the current situation.

These adjustments are made on the basis of informed judgement, using current available information about forest management, which may well have changed since the original information package was assembled. Forest management data is particularly subject to change during periods of legislative or regulatory change, such as the enactment of the Code, or during the implementation of new policies, procedures, guidelines or plans.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but a synthesis of judgement and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case forecast. Judgements that may be based in part on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, once an AAC has been determined, no additional precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined.

Timber supply analysis for the Kamloops TSA

The base case harvest forecast presented in the *July 2001 Kamloops Timber Supply Area Analysis Report* incorporated the most current available information on current forest management, land base and timber yields for the TSA. It included specific assumptions about the TSA that are discussed in detail in the analysis report.

In this rationale, I will discuss many of those analysis assumptions in the context of my considerations for this AAC determination. However, where my review of an assumption has concluded that I am satisfied it was appropriately modelled in the base case of the timber supply analysis, I will not discuss my considerations in detail in this document, other than to note my agreement with the approach that is already documented in the timber supply analysis report. Some factors for which the assumptions were appropriately modelled in the analysis may warrant discussion, however, for other reasons, such as a high level of public input, lack of clarity in the analysis report, or concerns resulting from the previous determination for the Kamloops TSA. As a result, I may choose to provide my consideration of such factors in this rationale.

A 'base case' harvest forecast was generated that incorporated the factors appropriate to the TSA and was submitted for public review. The base case projected that the harvest from the partition for cedar and hemlock stands could be maintained for another decade until the licence for harvesting in these stands expires. The partitioned harvest for PA 16 could be maintained for 2 decades. Harvesting on the remainder of the timber harvesting land base – the "conventional" portion of the harvest – could be maintained at the initial harvest level of 2 361 900 cubic metres for the next 70 years. After 7 decades, the harvest level would then have to decrease by approximately 5 percent to the long-term harvest level of 2 246 000 cubic metres per year.

The harvest levels projected in the base case in this timber supply analysis are greater than those projected for the 1995 timber supply review for the Kamloops TSA. There were many changes in management practices, the size and availability of the timber harvesting land base and modelling capabilities since the last analysis was completed. Factors contributing to the change in the harvest projection include the following: the current timber harvesting land base has increased by approximately 9.5 percent since the 1995 analysis (mostly due to the inclusion of PA 16 and cedar/hemlock stands in the timber harvesting land base); estimates of wildlife tree retention have been refined; the application of old forest cover requirements for landscape level biodiversity has been refined; more areas of the timber harvesting land base are subject to forest cover requirements for visual quality and these constraints are applied to each specific visual area; and estimates of unsalvaged losses have increased since the first timber supply review.

I have considered the criteria used to select the base case forecast, and I am satisfied that it provides a suitable basis from which to evaluate the assumptions regarding land base, management practices and timber yields for the Kamloops TSA. I have also considered all public input received on the data package and analysis report, and where appropriate I discuss these in my considerations under the various factors presented in this rationale.

Consideration of Factors as Required by Section 8 of the *Forest Act*

Section 8 (8)

In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

Land base contributing to timber harvesting

- general comments

As part of the process used to define the timber harvesting land base in the timber supply analysis, a series of deductions are made from the productive forest land base. These deductions account for the factors that effectively reduce the suitability or availability of the productive forest area for harvest, for ecological, economic or social reasons. The deductions in the Kamloops TSA timber supply analysis resulted in a current timber harvesting land base of 1 040 860 hectares.

I have considered all of the deductions applied in the derivation of the timber harvesting land base for the Kamloops TSA. Factors associated with the derivation of the timber harvesting land base for which, based on my thorough review, I accept the assumptions as modelled in the analysis are: woodlot licences and timber licences. Therefore, I have not discussed these factors in detail in this rationale.

Where my consideration of the information has identified a factor for which an adjustment is required, or the factor otherwise in my estimation requires discussion in this document, it is described below.

- economic and physical operability

Those portions of the TSA which are neither physically operable nor economically feasible to harvest are categorized as inoperable, and are excluded when deriving the timber harvesting land base. For the Kamloops TSA, BCFS staff in conjunction with licensee staff originally delineated operability lines in 1991, based primarily on physical access limitations, elevation and timber quality.

District staff indicate that harvesting is both occurring and being proposed in areas currently considered inoperable. However, there is evidence that some timber that is currently uneconomic to harvest has been included in the timber harvesting land base.

In my previous determination for the Kamloops TSA, I instructed district staff to monitor the harvesting activity in areas currently considered inoperable to determine if some of these areas should be included in the timber harvesting land base in the future. Since then, the IFPA holder (International Forest Products - 'Interfor'), in consultation with the Kamloops Forest District, delineated operability lines for the IFPA area in 1999 based on information from aerial photography, terrain stability mapping, TRIM contour mapping,

and forest cover mapping. Compared to the 1991 operability lines used in the Kamloops TSA timber supply analysis, the 1999 operability information would decrease the operable land base by 2 378 hectares. I note that the Clearwater Forest District have not officially approved these lines. I encourage the completion of the operability review, and the incorporation of any changes into the next timber supply review. In the meantime, I believe that the current operability lines provide a reasonable estimate of the land base physically and economically feasible to harvest.

Public input from the forest industry and the Shuswap Nation Tribal Council stated that the current operability lines are dated and need to be reviewed prior to evaluating biodiversity impacts. District staff have indicated that the most current operability lines from the review will be used for any biodiversity designations and evaluations.

For this determination, I am satisfied that the assumptions applied in the analysis for physical and economic operability represent current performance in the TSA, and are based on the best available information. As a result, I make no adjustments on this account.

- environmentally sensitive areas and terrain stability

Environmentally sensitive area (ESA) data—which identify areas sensitive to disturbance due to soil conditions, areas difficult to regenerate and/or with significant value for fisheries, wildlife, water or recreation resources—were used to exclude areas in the derivation of the timber harvesting land base for the Kamloops TSA. ESA classifications of E1 (highly sensitive) or E2 (moderately sensitive) may be used to exclude areas from the land base where more specific or detailed information is not available about a particular forest resource.

In my previous determination for the Kamloops TSA, I instructed district staff to undertake additional terrain mapping in the TSA to quantify the impact of environmentally sensitive areas on the size of the timber harvesting land base.

Terrain mapping information was not available for use in this timber supply analysis. Therefore, a 1996 review of ESAs was used as a basis for the timber supply analysis assumptions. Based on the results of this review, district staff recommended excluding all E1 areas from the timber harvesting land base. Also, because the review showed that E2 areas were being harvested, district staff recommended that they be fully included in the timber harvesting land base. These changes resulted in an additional 4000 hectare reduction to the timber harvesting land base compared to the previous analysis. In total, 108 967 hectares were excluded from the timber harvesting land base to account for environmentally sensitive areas in this timber supply analysis. District staff indicate that an assessment of harvesting operations in ESAs identified approximately 5100 hectares of ESAs in licensee forest development plan cutblocks.

BC Environment (now the Ministry of Water, Land and Air Protection) submitted that the Ministry of Forests should clarify that ESAs are to be replaced by better field data such as terrain class ratings. The agency further noted that because ESAs could become physically operable due to technological innovation, there is a danger that wildlife habitat areas presently classified as E1s could eventually be harvested, complicating habitat management. With respect to the first point, better terrain information will be used for

timber supply analysis when that information becomes available. Regarding the second concern, I acknowledge that if harvesting occurs in ESA areas that include important wildlife habitats, it could indeed complicate wildlife habitat management. However, I note that both the Kamloops Land and Resource Management Plan (KLRMP) and the *Forest Practices Code of B.C. Act* (FPC) require the consideration of wildlife as part of operations. I encourage Ministry of Forests staff to work with Ministry of Water, Land and Air Protection (MWLAP) staff to identify important habitats and develop strategies for their management that are consistent with the Forest Practices Code and the LRMP.

Public input received from the Shuswap Environmental Action Society (SEAS) and Yellowhead Ecological Association (YEA) submitted that terrain stability mapping should be used in place of ESA mapping for timber supply analysis. They emphasized that E2 areas should not necessarily be included in the timber harvesting land base and that some E2 areas would become more susceptible to damage due to harvesting activities; for example, sensitive riparian areas and steep slopes susceptible to erosion and landslide. I am aware that no exclusions were applied in the analysis to account for Es2 areas. However, based on the review of operations undertaken by district staff, I believe it is unlikely these areas are truly unavailable for timber harvesting.

Additional public input was received from the forest industry and the Shuswap Nation Tribal Council. They submitted that the FPC and the KLRMP eliminated the need for both recreation and water ESAs. In response to the first point, neither the FPC nor the KLRMP specifically eliminate the need for ESA classification for recreation and water. They also questioned what terrain hazard data is available and what mapping has been done of harvesting in E1 and E2 areas.

In response to the submissions regarding terrain stability mapping, I note that while there is some terrain stability mapping available in the Kamloops TSA, at this time there is no interpretation of how this information should be applied in the timber supply analysis for the TSA. The Ministry of Forests will endeavour to interpret this information, in consultation with licensees and other agencies, and incorporate it into the next timber supply review to ensure accurate representation of the timber supply impacts of sensitive sites. In the meantime, I have reviewed the exclusions applied to account for environmentally sensitive areas and I am satisfied that the assumptions in the analysis were appropriate and based on the best available information.

- sites with low timber growing potential and unmerchantable forest types

Sites with low productivity as a result of inherent site factors such as nutrient availability, exposure, excessive moisture, or that are not fully occupied by commercial tree species are excluded from the timber harvesting land base of the Kamloops TSA. In the timber supply analysis, 31 141 hectares were excluded from the timber harvesting land base because of low timber growing potential after deductions for parks, brush, inoperable areas, ESAs, and deciduous.

Stands that are physically operable and exceed low site criteria yet are not currently utilized because of low timber quality or volume ("unmerchantable forest types") are also excluded from the timber harvesting land base. This definition is based on economic criteria, for the

purpose of defining the timber harvesting land base. It does not imply that these types of forests are not important in terms of their role and function in the ecosystem. A typical unmerchantable forest type would be a stand with small trees and few merchantable stems. A total of 45 938 hectares were excluded in the derivation of the timber harvesting land base to account for unmerchantable stand types after accounting for parks, brush, inoperable areas, ESAs, deciduous, and sites with low productivity.

BCFS regional staff note that in the analysis, the stands contributing to PA 16 area were not subjected to low productivity or unmerchantable forest type exclusions. I will discuss specific concerns about unmerchantable forest types in PA 16 in the next factor, under Pulpwood Agreements.

Public input received from the forest industry and Shuswap Nation Tribal Council expressed concern that the criteria used to exclude sites of low productivity should have only been applied to stands younger than 80 years because the method used in the timber supply analysis could result in the exclusion of some older, merchantable stands. I have reviewed the criteria used to exclude low-productivity sites, and note that there is an insignificant amount of harvesting taking place on low-productivity sites in the Kamloops TSA. Therefore, I am satisfied that the criteria used to exclude low-productivity sites were an appropriate reflection of current practice and suitable for use in this determination.

The forest industry and Shuswap Nation Tribal Council also submitted that licensees are now harvesting in older balsam and spruce stands with low crown closures, and that they should be included in the timber harvesting land base. In the timber supply analysis, all older balsam and spruce stands with a crown closure of 36 percent or less and an average height of less than 28.5 metres were excluded from the timber harvesting land base. According to the submission, the criteria should be revised to exclude only those stands with a crown closure of 25 percent or less given that harvesting has occurred in stands with crown closure values this low. I have considered this input, and I note that while there is anecdotal information that a small amount of harvest may be occurring in some stands with low crown closure, district staff indicate that as a whole, the criteria used in the timber supply analysis reasonably reflect current practice within the TSA. In the absence of data to support either full or partial inclusion of these low-crown-closure balsam and spruce stands in the timber harvesting land base, the assumptions used in the timber supply analysis represent the best available information.

Having considered the information in the analysis about accounting for low timber productivity and unmerchantable forest types, I am satisfied that the criteria were reasonable and suitable for use in this determination.

- Pulpwood Agreements

There are two pulpwood agreements that cover portions of the Kamloops TSA – Pulpwood Agreement (PA) 2 and PA 16. PA 2 covers a significant portion of the TSA; however, since the licence remains inactive, I do not believe it has implications for timber supply at this time. Therefore, I make no adjustments on this account.

PA 16 covers parts of the Kamloops as well as the Williams Lake, 100 Mile House and Lillooet TSAs. The PA was issued in April 1990 to Ainsworth Lumber Co. Ltd. as a 25-year non-replaceable licence. In 1996, I established a partition to allow a maximum of 86 000 cubic metres per year to be harvested under PA 16 within the Kamloops TSA. Since 1996, an average of 26 900 cubic metres per year has been harvested under the agreement. A non-replaceable forest licence was awarded in May 2001 to a joint venture between the Skeetchestn Indian Band and Ainsworth Lumber Co. Ltd. for 15 000 cubic metres per year for a period of 10 years. This tenure uses volume originating from PA 16.

PA 16 includes 84 283 hectares of timber harvesting land base. In the base case harvest forecast, the PA 16 partition is projected to be harvested for 2 decades to approximate the term of the current non-renewable PA 16 tenure. The areas under the partition are assumed to be regenerated, and remain within the timber harvesting land base. Those portions of the timber harvesting land base associated with PA 16 that remain unharvested after 2 decades are removed from the timber harvesting land base. The base case harvest forecast shows that 73 100 ha remain unharvested after 2 decades. If the actual amount of harvesting under PA 16 exceeds the amount projected in the base case, the timber harvesting land base of the Kamloops TSA may be larger than assumed in the analysis. However, it is important to note that the areas subject to PA 16 have low site productivity, so their contribution to timber supply would be less than the average volumes harvested in the rest of the TSA.

Four forest industry-based submissions commented on the definition of stands contributing to PA 16. The forest industry and Shuswap Nation Tribal Council submitted that the criteria for defining what stands contribute to PA 16 should be negotiated and finalized by Ainsworth and the Ministry of Forests. Both the 100 Mile House TSR Licensees Working Group and the Williams Lake TSA Association submitted concerns about the definition of stands contributing to PA 16, and the allocation of the harvest under PA 16 between forest regions. I have considered this input, and I note that a tri-partite committee, comprised of Ainsworth and both the Kamloops and Cariboo Forest Regions, is currently reviewing issues related to this licence including amendment, apportionment by region, harvest profile, and licence security beyond expiry. I expect this tri-partite committee will address the issues raised in the aforementioned submissions.

Input received from Ainsworth Lumber Co. Ltd. expressed the concern that the definition of stands contributing to PA 16 that was used in the analysis is incorrect, and reduces the timber supply available to Ainsworth's oriented strand board (OSB) facility. The current timber supply analysis uses the definition from a 1997 process to redistribute operating areas. In the licensee's opinion, the analysis should have used the original definition of these stands as described in the 1981 timber supply analysis, which was originally used as a basis for defining the area of PA 16. Similarly, the 100 Mile House TSR Licensees Working Group also expressed the opinion that the 1981 definition of PA 16 stands should

have been used in the timber supply analysis, and that the reduction in the land base contributing to PA 16 from the Kamloops TSA would put additional timber supply pressure on the 100 Mile House TSA.

I have considered the information submitted by Ainsworth Lumber Co. Ltd and 100 Mile House TSR Licensees Working Group. Using historical records, regional staff estimated that the land base contributing to PA 16 using the 1981 definition would be approximately 63 000 hectares. Furthermore, I note that the definition of stands contributing to PA 16 was refined in a 1995 Regional Manager's letter, and effectively increased the land base available to PA 16 to 84 283 hectares. I am therefore satisfied that the current timber supply analysis has not underestimated the timber supply available to PA 16.

The YEA and SEAS submitted that if no logging takes place under PA 16, the marginal timber included in PA 16 should be excluded from the cut. I agree that it is unlikely that all of the stands included in PA 16 should be included in the timber harvesting land base in the absence of harvesting under PA 16. The future contribution of these stands to the timber harvesting land base will continue to be examined over time. I also acknowledge that the environmental and ecological objectives for these stands will continue to be refined and expressed and this too should be periodically reviewed in future AAC determinations.

In summary, I am aware that there is uncertainty about the definition of stands that contribute to PA 16. However, I believe that there is an adequate supply of timber available to PA 16 to support the partition, particularly considering the licence expires in 13 years. I also recognize that if harvesting under PA 16 exceeds the amount projected in the base case harvest forecast, the future timber harvesting land base of the Kamloops TSA may be larger than projected in the analysis. I have considered this uncertainty as discussed below, under 'Reasons for decision.'

- old cedar and hemlock stands

The 1996 AAC determination included a partition of 200 000 cubic metres per year for old cedar and hemlock stands. The base case harvest forecast addressed this partition by projecting the harvest of the partition for one decade, the approximate term of the current non-renewable partition tenures. After the first decade, the stands subject to the partition were assumed to be excluded from the timber harvesting land base. The cedar/hemlock partition area initially comprises 49 744 hectares of the timber harvesting land base. After a decade of harvesting, 40 700 hectares are projected to remain unharvested, and are excluded from the timber harvesting land base.

Public input received from the YEA and SEAS submitted that the low harvest scheduling priority placed on cedar and hemlock stands in the data package shows that little harvesting is taking place in these stands. If this is the case, then these stands should be removed from the timber harvesting land base to prevent undue timber supply pressure on the remainder of the land base. They add that cedar and hemlock stands have high ecological values and should remain unharvested, particularly considering that there is little benefit to forcing companies to log uneconomic timber.

In response to these submissions, I note that from 1999 to 2000, an average of 172 000 cubic metres per year has been harvested from cedar and hemlock stands.

Furthermore, I have also received input from licensees operating in these stand types, emphasizing their reliance on the partition volume. It is clear to me that harvesting is taking place in these stands, and that the licensees harvesting under the partition are able to do so successfully. Nonetheless, I acknowledge the high ecological value of these stands, and representation of these values is addressed below, under *Landscape-level biodiversity*.

As with the partition for PA 16, it is possible that these stands will have a greater the contribution to the timber harvesting land base compared to what was modeled in the base case harvest forecast. Sensitivity analysis was completed to assess the timber supply implications if both PA 16 and cedar and hemlock stands remained in the timber harvesting land base. The results indicate that the long-term harvest level could be increased by approximately 157 000 cubic metres (7 percent) with the inclusion of all partition areas in the timber harvesting land base.

In conclusion, I am satisfied that the current definition of the partition remains appropriate, and that the timber supply analysis reasonably reflected current operations within cedar and hemlock stands. I believe it is reasonable to expect harvesting to continue within these stands, and that it is possible that these stands will continue to contribute to timber supply beyond what was modeled in the timber supply analysis. Accordingly, it is likely that timber supply has been underestimated in the base case due to the removal of cedar and hemlock stands from the timber harvesting land base, and I have considered this uncertainty as discussed below, under 'Reasons for decision.' The future contribution of these stands to the timber harvesting land base will continue to be examined over time.

- deciduous forest types

Deciduous forest types are those dominated by broad-leaved, deciduous species. All stands dominated by deciduous species are excluded from the timber harvesting land base. In addition, any deciduous volume within stands dominated by coniferous species was removed from the timber supply.

District staff indicate that there has been some harvesting of deciduous species in the Kamloops TSA. Ainsworth Lumber Co. Ltd. has harvested approximately a total of 11 200 cubic metres of deciduous under the PA 16 during the period from 1996 to 2000. In addition, I note that West Fraser Mills has harvested about 4500 cubic metres of deciduous from 1996 to 2000 as a requirement of their forest licence. Over this same time period, other licensees have harvested approximately 85 000 cubic metres of deciduous species from mixed stands. On average, approximately 20 140 cubic metres per year of deciduous species have been harvested in the Kamloops TSA in recent years.

I further note that Ainsworth Lumber Co. Ltd. is interested in harvesting deciduous-leading forest types that are outside the PA 16 area of the TSA. Ainsworth provided a detailed analysis of deciduous forest types, identifying approximately 22 000 hectares of deciduous-leading stands over 60 years of age, of which 11 000 hectares are assumed to be available considering constraints such as operability, merchantability, ESAs, and riparian areas. Out of this area, Ainsworth has identified 4400 hectares as potential cutblocks with an average estimated volume of 150 cubic metres per hectare.

I believe it is likely there is an opportunity to harvest deciduous species beyond what is presently taking place within the TSA, and I am uncertain as to what extent deciduous volumes from coniferous-dominated stands can meet the demand for deciduous volume. The available supply of deciduous-leading forest types older than 60 years could be as much as 22 000 hectares. However, it is likely significantly less due to constraints on the availability of the land and the natural succession of deciduous-dominated stands to coniferous-dominated stands. I note that in the current timber supply analysis, 37 878 hectares of deciduous forest types of all ages were excluded from the timber harvesting land base after deductions for parks, brush, inoperability, and ESAs. Therefore, I believe Ainsworth's estimate of available deciduous forest types over 60 years old (11 000 hectares) is reasonable.

I conclude that there is an emerging demand for deciduous volume that can be accommodated within a partition, and I have accounted for this below, under 'Reasons for decision'. In the meantime, I note that district staff have concerns about volume estimates for these stands, and the adjacency implications of harvesting deciduous-leading stands. I also recognize that there is uncertainty about the silvicultural regimes to be used on deciduous-dominated sites. I encourage the District Managers to work with licensees to develop a long-term forest management plan for these sites.

- existing and future roads, trails and landings

In the analysis, a percentage of the productive forested area was excluded to account for the permanent loss of productive land to roads, trails, and landings. Separate estimates are made for existing and future structures, to reflect both potential changes in road building practices and road network requirements over time. Estimates account for the area that is permanently removed from the timber harvesting land base.

To estimate the amount of area covered by existing roads, trails and landings, district staff applied a 13-metre buffer to all existing primary roads and a 10-metre buffer to all existing secondary roads on the inventory file. To account for existing on-block disturbance and landings, district staff applied a 4.9-percent area reduction to all harvested sites (areas younger than 31 years) based on site degradation samples taken from 1986 to 1992. The total area removed from the productive forest for these existing features was 24 045 hectares.

District staff expressed a concern that roads in the Clearwater district may be wider than assumed in the analysis. On the other hand, I note that for the IFPA analysis, based on Interfor's estimate of existing road widths within the IFPA area, there is less area (1301 hectares) deducted than in the Kamloops TSA timber supply review analysis. It is unclear whether these road width estimates would be appropriate to apply throughout the TSA. The regional research soil scientist has reviewed road data gathered in the Kamloops and Clearwater Forest Districts, and concluded that they were reasonably consistent with the assumptions used in the Kamloops TSA timber supply analysis. I accept the expert opinion of the regional research soil scientist. I note that work is underway to confirm road width estimates as part of a larger study, and I encourage district staff to use the resulting data to better reflect buffer widths for future analyses.

To account for future roads, trails and landings, a land base reduction of 6.5 percent was made to all stands older than 30 years after they were harvested for the first time in the timber supply analysis. The total area removed from the productive forest for future roads, trails and landings was 47 434 hectares.

Public input from the forest industry and the Shuswap Nation Tribal Council questioned how the current practice of rehabilitation and/or planting of roads was incorporated into the timber supply analysis. District staff report that rehabilitation and planting of roads were accounted for in estimates of existing roads, trails and landings, but were not accounted for in the estimates for future roads, trails and landings. They note that approximately 140 hectares of old landings and trails, and 10 hectares of roads in the TSA have been rehabilitated to some extent in the past 5 years. They believe that there may be more rehabilitation being done, but at this time, there is no tracking of rehabilitation activities. Monitoring of the amount of rehabilitation is required in order to assess the applicability of adjusting the estimate of future roads, trails and landings. In the meantime, I note that the short-term implication of known road rehabilitation has been captured in the estimate of existing roads, trails and landings. Any long-term timber supply implication of future road rehabilitation to the degree discussed above are insignificant relative to the size of the timber harvesting land base, so I make no adjustments for this determination.

In conclusion, I have reviewed the exclusions applied to account for roads, trails and landings in the analysis, and I am satisfied that they were modelled using the best available information.

Existing forest inventory

The inventory data used for the timber supply analysis for the Kamloops Forest District is based on 1995 photography and a 1996 re-inventory. For the Clearwater Forest District, the inventory information is based on 1990 photography and a 1992 re-inventory. For the analysis, forest cover attributes were projected to January 1, 1997. Volume depletions due to harvesting were updated to at least December 1, 1996.

I have considered the information about the forest inventory. Subject to considerations around volume estimates for existing stands, I am satisfied that the best available information was used in the analysis. My considerations about the volume estimates for existing stands are discussed in the next section of this rationale.

- existing stand volume estimates

Volumes for existing natural stands (in which species and stocking have not been managed) were estimated and projected using forest inventory attributes and the Variable Density Yield Prediction (VDYP) model which was developed by the former BCFS Resources Inventory Branch (now the Terrestrial Information Branch in the Ministry of Sustainable Resource Management). An audit of the Kamloops Forest District inventory was undertaken in 1995, and confirmed that mature stand volume estimates on the operable land base were reasonable. Similarly, the 1997 inventory audit for the Clearwater Forest District supported estimates of mature stand volumes on the operable land base.

Public input from the YEA and SEAS noted that since companies regularly log the highest volume stands first, the remaining stands should have less volume per hectare and this should be reflected in the analysis. The volume projections for the remaining stands are based on their attributes and therefore lower volumes are indeed projected in the analysis as suggested. YEA and SEAS further commented that the results of recent inventory audits were not included in the timber supply analysis, and that results of volume-ratio sampling should be incorporated into the analysis.

I have considered the input received about the existing stand volumes. In response to the first point, I note that in the analysis, the volume per hectare harvested in the base case is projected to decline over time. Therefore, I believe the analysis reasonably reflects the harvesting priorities observed by the YEA and SEAS. In response to their second point, I note that the inventory audit found no statistically significant difference between the audit volumes for operable mature stands and the inventory volumes, both for the TSA as a whole and for the districts.

Overall, district staff consider that the volume estimates for existing stands are appropriate. However, Clearwater Forest District staff expressed the concern that volume may be overestimated for spruce and balsam stands in the Engelmann Spruce/Subalpine Fir (ESSF) ecosystem in the Clearwater Forest District. To explore this issue further, region and branch staff looked at the statistics for the samples taken in ESSF areas in the inventory audit. They found that when the 11 inventory audit samples of spruce-dominated stands in the ESSF were compared to the inventory volumes, spruce-dominated stands in the ESSF are 20 percent overestimated in the inventory. Based on 9 samples from balsam-leading stands in the ESSF, volumes for these stands are overestimated by 1.4 percent in the inventory. On the other hand, the rest of the spruce samples in the district (7 samples in the Interior Cedar Hemlock zone) showed that the inventory *underestimated* spruce stand volumes by 18 percent.

Vegetation Resource Inventory (VRI) information collected as part of the work to support the Adams Lake Innovative Forestry Practices Agreement (IFPA) indicated that existing stand volume estimates for ESSF stands within the IFPA area have been overestimated. I have accounted for this overestimation within the IFPA area as discussed below, under 'Adams Lake Innovative Forestry Practices Agreement' and under 'Reasons for decision'. In addition, Ministry staff examined Vegetation Resource Inventory (VRI) "Phase II" data collected from 48 plots in the Kamloops TSA. This data has just recently been compiled since the AAC determination meeting held in Kamloops in December 2001. It indicates that the inventory is overestimated by as much as 12 percent, with most of the overestimation attributable to pine stands (rather than spruce and balsam stands). I am aware that the data has been collected from a limited number of samples, and as a result, I believe there is some uncertainty about the conclusions drawn from the VRI data. Nonetheless, I also recognize that the timber supply in the Kamloops TSA is very sensitive to changes in existing stand volumes. Sensitivity analysis shows that if existing stand volumes are 10 percent less than assumed in the base case, the initial harvest level is 9 percent lower than in the base case.

I have considered these interpretations of the inventory audit and VRI data. I am mindful that there may be local problems with some of the volume estimates that have been verified

by the operational experience of Clearwater Forest District Staff. I also note that the inventory audit information becomes less statistically reliable the more it is disaggregated and examined as subsets since the sample size becomes very small. Furthermore, the inventory audit indicates that overall there is no statistical difference between the inventory volume estimates and the volumes from the inventory audit. At the same time, VRI data indicates that existing stand volumes in the TSA may actually be overestimated. It is clear that there is a great deal of uncertainty about existing stand volumes, and better information is needed to assess the reliability of existing stand volume estimates for the next determination. In the meantime, I conclude that with the exception of existing stand volume estimates assumed within IFPA areas, the base case harvest forecast is based on the best available information and that, on average, the inventory volumes provide a reasonable basis for the timber supply analysis. Therefore, I make no adjustments for this determination other than the adjustments associated with the IFPA area, as discussed below under 'Innovative Forestry Practices Agreement' and 'Reasons for decision'.

Expected rate of growth

I have considered the information regarding the expected rate of growth for stands. I am satisfied that the analysis assumptions for regenerating stand volume estimates are appropriate, and I will not discuss my considerations of these factors in detail in this rationale, with the exception of site productivity estimates, the various operational adjustment factors applied to volume estimates to account for the influence of root diseases, and the use of select seed.

- site productivity estimates

Inventory data includes estimates of site productivity for each forest stand. Site productivity is expressed in terms of a site index, which is based on the stand's height as a function of its age. The productivity of a site largely determines how quickly trees grow, which in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced, and the age at which a stand will reach a merchantable size.

In general, in British Columbia, site indices determined from younger stands (i.e. less than 31 years old), and older stands (i.e. over 140 years old) may not accurately reflect potential site productivity. In young stands, growth often depends as much on recent weather, stocking density and competition from other vegetation, as it does on site quality. In old stands, which have not been subject to management of stocking density, the trees used to measure site productivity may have grown under intense competition or may have been damaged, and therefore may not reflect the true growing potential of the site. This has been verified in several areas of the province where studies—such as the Old-Growth Site Index (OGSI) 'paired plot' project and the 'veteran' study—as well as results from using the Site Index Biogeoclimatic Ecosystem Classification System (SIBEC) suggest that actual site indices may be higher than those indicated by existing data from old-growth forests. Such studies indicate that site productivity has generally been underestimated by the inventory file data; managed stands tend to grow faster than projected by inventory-based site index estimates from old-growth stands.

Approximately 29 percent of the stands on the timber harvesting land base are currently greater than 140 years of age. Sensitivity analysis was used to assess the impact to timber supply if site productivity is underestimated to the extent suggested by the OGSI studies. In the sensitivity analysis, the site indices of all stands older than 140 years of age were adjusted based on the provincial OGSI studies. Minimum harvestable ages were also adjusted to account for the increased site productivity. The sensitivity analysis results indicate that short-term timber supply could be increased by up to 5.5 percent, and long-term timber supply could be increased by 11 percent if these provincial OGSI adjustments were applicable to the stands in the Kamloops TSA. I note that 20 percent of the provincial OGSI plots were collected within pine and spruce-dominated stands in the Kamloops Forest Region, and therefore the data may be somewhat applicable to the stands in the Kamloops TSA.

While district staff do not know the precise magnitude of the site productivity underestimation applicable to the stands in the Kamloops TSA, they note that local studies in the adjacent TFL and IFPA indicate similar trends as shown in the provincial study. For areas within the IFPA, the site index adjustment project shows that the existing forest cover inventory underestimates site indexes for Douglas-fir by 29 percent, spruce by 21 percent, and pine by 43 percent. I note that there are concerns that these higher site indexes will not fully apply at higher elevations.

While I acknowledge that there is uncertainty related to the ultimate performance of stands relative to their potential, data from provincial studies clearly demonstrates that stands in the province are growing at a much faster rate than would be expected based on measurements from the standing old growth inventory.

In this determination, I am prepared to take into account the implications of an underestimation in volumes for regenerating stands as a result of underestimated site productivity. I will discuss my considerations of this further under 'Reasons for decision'.

- operational adjustment factors

Regenerating stand volume projections are initially based on ideal conditions, assuming full site occupancy and the absence of pests, diseases and significant brush competition in the stand. Certain operational conditions, such as less than ideal tree distribution, small non-productive areas, endemic pests and diseases, or age dependent factors such as decay, waste and breakage may cause yields to be reduced over time. Operational adjustment factors (OAFs) are applied to yields to account for losses of timber volume as a result of these operational conditions. OAF 1 can account for factors affecting the yield curve across all ages, such as small stand openings. OAF 2 can account for factors whose impacts tend to increase over time, such as pests, disease, decay, waste, and breakage, whose influence on a stand may often be reduced through management practices.

In the analysis, the standard provincial reductions of 15 percent for OAF 1 (accounting for less than ideal tree distribution, small non-productive areas, endemic pests and disease, and random risk factors such as windthrow), and 5 percent for OAF 2 (accounting for decay, waste and breakage) were applied to all stands.

Public input from both YEA and SEAS expressed concern that volume projections did not account for pest and disease damage such as spruce weevil and root rot, windthrow, wildfire, and other impacts on stand productivity. While I recognize that the OAFs used in the analysis account for stand productivity losses or openings in stands, including those attributable to spruce weevil and root rot losses, I am also aware that there is uncertainty about the impact of root rot on the productivity of regenerating stands. Analysis work has been done in support of the Adams Lake IFPA that included a 5 percentage point increase in OAFs for Douglas-fir leading managed stands in the ICH and IDF subzones in recognition of the higher incidence of root rot in these stands. In addition, in the adjacent Okanagan TSA and in the Kootenay Lake Forest District, expert review of the productivity of regenerating stands subject to root disease supported the use of higher OAFs. Therefore, I believe it is likely that there has been a small but unquantified overestimation of regenerated stand volumes in the base case, and I have discussed this issue below under 'Reasons for decision'.

- use of select seed

The Forest Practices Code requires the use of the best genetic quality (seed and vegetative material) source available for regeneration. Select seed produced from seed orchards is the product of B.C.'s forest gene resource management program, which uses traditional tree breeding techniques to select naturally-occurring, well-adapted, healthy and vigorous trees.

Select seed from seed orchards produces trees that grow faster than those from natural stands. As a result, a stand composed of such trees has a greater volume at the same age than a natural stand with the same species composition. Current expectations are that the volume differences will begin to decrease beyond a certain stand age.

No adjustments were applied to account for the use of select seed in the base case forecast for the Kamloops TSA. However, district staff indicate that from 1993 to 2000, approximately 24 percent of the seedlings used for reforestation in the Kamloops TSA have been from improved stock. Based on the current level of select seed use, it is estimated that long-term timber supply would be approximately 2.5 percent higher than in the base case. Medium-term timber supply would also be increased due to reductions in the amount of time for stands to reach green-up conditions.

I have considered the information regarding the use of select seed in the Kamloops TSA. I am satisfied that it is appropriate to account for the timber supply implications of the current level of use, and discuss this issue under 'Reasons for decision'.

- minimum harvestable ages

A minimum harvestable age (MHA) is an estimate of the earliest age at which a forest stand has reached a harvestable condition and has met minimum merchantability criteria. The MHA assumption largely affects when second-growth stands will be available for harvest. In practice, many forest stands will be harvested at older ages than the MHA, due to economic considerations and constraints on harvesting that arise from managing for other forest values such as visual quality, wildlife and water quality.

For this analysis, the MHAs for existing stands were based on district staff experience and input from local forest industry representatives, and ranged from 60 years for deciduous stands to 140 years for stands within the cedar and hemlock partition. For future stands, the MHAs were based on the age at which the 90 percent of the maximum mean annual increment volume is reached. The MHAs for regenerating stands ranged from about 80 years on good and medium sites to 130 years on poorer sites.

Submissions were received that expressed concern that the MHAs should reflect the ecological rotation of sites to be consistent with the Kamloops LRMP. However, district staff indicate that The Kamloops LRMP does not define what an "ecological rotation" is and does not specify that an ecological rotation is required. Furthermore, I note that MHAs represent a *minimum*, and that many stands will be harvested well beyond their MHAs due to other constraints on the land base. This is further evidenced by reviewing the average age of stands harvested in the analysis as compared to the minimum harvestable ages.

The forest industry also expressed the opinion that minimum harvestable ages should be reduced to 70 years for some of the existing stands. However, I note that approximately 66 percent of the existing forest is currently older than the applicable minimum harvestable age. Therefore, reducing the minimum harvestable ages would not have any impact on the age at which stands are harvested in the short term. Furthermore, district staff indicate that at present, there is a need to prioritize older stands for harvest to meet forest management objectives.

Having reviewed the minimum harvestable age criteria, the average age of stands harvested in the analysis, and the various views put forward on this subject, I conclude that the range of ages used for MHAs seems reasonable. I also observe that sensitivity analysis shows that short-term and long-term timber supply are insensitive to a 10-year increase or decrease in MHAs. Therefore, I have made no adjustments in this regard.

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

Expected time for forest to be re-established following harvest

I have reviewed the information regarding regeneration delay and impediments to regeneration, and I am satisfied that the assumptions in the analysis for these factors were appropriate. However, I do note that district staff need to continue monitoring impediments to regeneration and adjusting forest management practices to address survival in high elevation cold sites. I recognize that there is ongoing research in the Kamloops Forest Region, and urge that research must continue to inform practices on these sites.

- not-satisfactorily-restocked areas

Not-satisfactorily-restocked (NSR) areas are those areas where timber has been removed, either by harvesting or by natural causes, and a stand of suitable forest species and stocking has yet to be established. Where a suitable stand has not been regenerated and the site was harvested prior to 1987, the classification is 'backlog' NSR. In the analysis, it was assumed that 3129 hectares of backlog NSR would be restocked by 2002. All other NSR (11 400 hectares) is considered 'current' NSR, and was assumed to be regenerated within

the regeneration delay period.

Public input from the SEAS and YEA expresses the concern that NSR areas may not be restocked by the year 2000, given decreases in funding to Forest Renewal BC (which has subsequently been eliminated) and the Ministry of Forests. YEA also commented that a portion of the backlog will not become free-growing with preferred species, due to inappropriate use of mechanical site preparation and planting. I have reviewed these comments regarding the restocking of backlog NSR sites, and note that district staff indicate the amount of backlog NSR has been reduced to about 1700 hectares at this time, and that the remaining backlog NSR is projected to be restocked by 2005. Although some backlog NSR areas will be restocked a few years later than assumed in the base case, this delay will have an insignificant impact on the overall timber supply, and I therefore will make no adjustment on this account.

Additional public input was received from Weyerhaeuser, who submitted that current NSR should not be considered in the analysis because the regeneration delay component of the yield curve accounts for current NSR. Areas designated current NSR should be assigned yield curves effective from the date of harvest, according to the company. In response to this comment, I respond that in the analysis, it was assumed that current NSR areas would be regenerated within the regeneration delay period, as submitted by Weyerhaeuser.

I note that the estimation of current NSR is consistent with the amount of harvesting that has taken place recently in the Kamloops TSA. Based on my review of the information, I accept that NSR areas have been appropriately accounted for in the analysis.

(iii) silviculture treatments to be applied to the area,

Silvicultural treatments to be applied

I have reviewed the information regarding commercial thinning and incremental silviculture, and I am satisfied that the base case assumptions for these factors appropriately represent current management and available information. Consequently, I will not discuss my considerations in further detail in this rationale.

- silvicultural systems

The majority of the harvesting in the Kamloops TSA is done through the use of even-aged silvicultural systems. Of all harvested areas, approximately 85 percent are harvested using clear cut silviculture systems or clear cuts with reserves, 10 percent are harvested using selection silviculture systems, and 5 percent are harvested as patch cuts and immature cuts.

Public input received from SEAS and YEA questioned why silvicultural systems in the *Data Package* did not include uneven-aged stands, even though selection systems are used extensively in the Kamloops Forest District and the last AAC determination recommended inclusion of this type of management in future Timber Supply Reviews. In response to this input, I note that in the timber supply analysis, it was assumed that 85.5 percent of the area is harvested using clear cut silviculture systems, and 14.5 percent of the area is harvested as selection silviculture systems. I am satisfied that the assumptions in the analysis reflect current operations in the Kamloops TSA.

YEA also submitted the opinion that selection silvicultural systems should be used in Forest Ecosystem Networks (FENs) and Old Growth Management Areas (OGMAs), as required by the Forest Practices Code. YEA further submits that where large areas are harvested using clear cut silvicultural systems, the Forest Practices Code requires the retention of 40 percent basal area to conserve biodiversity. I agree that the Forest Practices Code requires some conservation of forest structure for biodiversity, and I have addressed this issue as discussed below, under *landscape-level biodiversity*. However, I note that there is no requirement for retention of 40 percent basal area, and no FENs have been identified in the Kamloops TSA. I further note that at this time, OGMAs are not harvested. Therefore, I have made no adjustments on this account in my determination.

Input received from a forest industry licensee questioned the projected increase in the amount of area harvested using selection silvicultural systems from 1800 hectares to a maximum of 4900 hectares in the timber supply analysis. Kamloops Forest Region staff indicate that the area harvested selectively changes through time in response to forest management requirements. For example, historically there has been more selection harvesting than at present in the Kamloops TSA. However, the current mountain pine beetle outbreak is directing operations into pine forest types, and so less selection or patch harvesting is taking place. There is an expectation that the use of selection silvicultural systems will increase in dry-site Douglas-fir forests and visually sensitive areas.

For areas harvested using a clear cut with reserves silvicultural system, there is some uncertainty as to whether the volume left as reserves has been fully accounted for in the analysis. Much of this volume is accounted for through the 2.12 percent volume reduction applied to stands to account for wildlife tree retention, and through requirements for visual quality maintenance. Also, there is a possibility that some of this reserve volume will be harvested in the future. However, district staff indicate that the volume left in reserves may be larger than accounted for in the analysis, particularly in areas being harvested as part of mountain pine beetle management. There is also some uncertainty about the effect of shading on the future crops. To address this uncertainty for future determinations, district staff should examine retention levels, and clarify long-term management intentions for areas harvested under the clear cut with reserves silvicultural system and the associated impact of shading under this silvicultural regime.

In conclusion, I have reviewed the information regarding silvicultural systems, and I am satisfied that the base case assumptions for these factors were appropriate. I recognize the uncertainty about the amount of retention on blocks harvested using the clear cut with reserves silvicultural system, and I encourage BCFS and staff of Ministry of Water, Land and Air Protection to investigate this further.

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

Timber harvesting

- utilization standards

Utilization standards define the species, dimensions and quality of trees that must be harvested and removed from an area during harvesting operations. The standards used in the timber supply analysis were consistent with values applied regionally and in other coastal units.

For coniferous stands included in PA 16, the standard for minimum diameter at breast height (dbh) assumed in the analysis was 12.5 centimetres. District staff indicate that current practice in these stands is to harvest all stems larger than 7.5 centimetres dbh. As a result, the base case harvest forecast underestimates the amount of volume harvested from coniferous stands in PA 16. I believe that the additional volume to be gained in the analysis from modeling to a minimum dbh of 7.5 centimetres in these stands would have a small, unquantified impact on timber supply.

In addition, I note that in the analysis, it was assumed that all stands would be harvested to a minimum 10 centimetre top diameter. In practice, the utilization standards vary from this assumption, with a minimum top diameter of 15 centimetres for cedar and hemlock stands older than 140 years and a minimum top diameter of 8 centimetres for coniferous stands under PA 16 and coniferous stands harvested by West Fraser. Regional staff indicate that the timber supply implications of modeling to the appropriate top diameter for these stands are insignificant, and I have made no adjustment on this account in my determination.

Having considered the information about the utilization standards in the Kamloops TSA, I will take into account a slight underestimation of timber supply for stands within the partition for PA 16, and I will discuss this further under 'Reasons for decision'.

- decay, waste and breakage

The estimation of volumes for existing stands incorporates the loss of volume due to decay, waste and breakage. To account for decay, volume losses are incorporated directly into the volume estimates, while standard waste and breakage factors are applied in the analysis in the development of VDYP yield curves. These estimates of losses have been developed for different areas of the province based on field samples. For regenerated stands, as discussed in *operational adjustment factors*, the projections for regenerated stand volumes incorporate OAFs that account for anticipated decay, waste and breakage.

In the timber supply analysis for the Kamloops TSA, the standard decay, waste and breakage criteria were applied. District staff confirm that the decay, waste and breakage factors applied in the analysis are appropriate. However, they note that in old cedar and hemlock stands in the TSA, licensees are removing approximately half of the volume anticipated from the cruises. Destructive sampling has confirmed that the decay, waste and

breakage factors for hemlock are appropriate, but no such sampling has been done for cedar.

I have reviewed the information regarding decay, waste and breakage, and I recognize that there may be an unquantified overestimation of volumes in old cedar and hemlock stands. However, I note that there is no sound evidence that these volumes have been underestimated. Further, regional staff indicate that uncertainty about old cedar and hemlock stand volumes does not pose a risk to the timber supply available to the cedar and hemlock partition. Therefore, I have made no adjustment to the assumptions applied in the analysis. I request that data be gathered to better assess decay, waste and breakage in cedar and hemlock stands prior to the next timber supply review for the Kamloops TSA.

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production,

Integrated resource management objectives

The Ministry of Forests is required under the *Ministry of Forests Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

To manage for resources such as water quality and aesthetics, current harvesting practices limit the size and shape of cutblocks and amount of disturbance (areas covered by stands of less than a specified height), and prescribe minimum green-up heights for regenerated stands on harvested areas before adjacent areas may be harvested. Green-up requirements provide for a distribution of harvested areas and retention of forest cover in a variety of age classes across the landscape.

In the timber supply analysis, as described in the July 2001 *Kamloops Timber Supply Area Analysis Report*, several management zones were created and different forest cover constraints were applied to the stands in each zone. These management zones—community watersheds, ungulate winter range, caribou habitat (three zones), preservation, retention, partial retention and modification visuals (four zones), and standard management—were developed to reflect different operational considerations.

I have reviewed the information presented to me regarding the analysis assumptions for cutblock adjacency/green-up and I am satisfied that the base case forecast has appropriately reflected current practice within these areas. As a result, I will not discuss my considerations of this factor in this rationale, other than to note that it would be beneficial to use spatial techniques in the next timber supply review to assess the operational benefits associated with the current practice of managing for large-size blocks and patch size distribution, which could increase access to timber in the short term. I have also reviewed concerns about range and forest-to-grassland reversion with district staff, and conclude that

they do not represent a constraint on timber supply at this time. At the same time, however, I acknowledge the need to continue to clarify the management strategies for these areas.

The factors discussed below are those for which I believe my consideration requires some documentation.

- visually sensitive areas

Careful management of scenic areas along travel corridors and near recreational sites is an important IRM objective. The Forest Practices Code enables the management of visual resources by providing for scenic areas to be identified and made known by the district manager or through a higher level plan, and by providing for the establishment of visual quality objectives (VQOs). A visual landscape inventory identifies, classifies and records visually sensitive areas within a landscape. Using such an inventory, recommended visual quality classes (RVQCs) of preservation, retention, partial retention or modification may be derived to guide operational practices. These recommended VQCs may become VQOs established by the district manager or through a higher level plan.

Management for visual quality applies to the Crown forested land within scenic areas. Visually sensitive areas were designated through the Kamloops LRMP. Scenic areas have been officially made known by the district managers in the Kamloops TSA. At this time, VQOs have been established only within the Kamloops Forest District; Clearwater Forest District RVQCs reflect the current management direction there.

To achieve objectives for visual quality, limits are placed on the amount of visible disturbance that is acceptable in visually sensitive areas. These limits act to constrain timber harvesting, road building and other forest practices. Guidelines to meet VQOs include setting a maximum percentage of a visual landscape allowed to be in a disturbed state at any one time, and setting visually effective green-up (VEG) targets that must be achieved before additional harvesting is permitted. VEG refers to the stage at which a stand of forested timber is perceived by the public to be satisfactorily greened-up from a visual standpoint.

Provincial guidelines provide a range of values for maximum disturbance in each visually sensitive class. The applicable disturbance value within the range is dependent on the visual absorption capacity (VAC) of the area, which is a measure of an area's physical capacity to absorb alterations while maintaining its visual integrity. An area with a low VAC can sustain relatively less disturbance than an area with a high VAC before the visual condition is compromised.

Approximately 39 percent of the timber harvesting land base in the Kamloops TSA is considered to be visually sensitive. In the analysis, zones were created for the scenic areas using the recommended and established visual quality classes, and the constraints were applied as the maximum percentage of productive forest area within each visually sensitive area that could be occupied by stands that were less than the specified green-up height.

The restrictions for green-up were applied to the entire productive forest land base because disturbance restrictions in visual areas apply to the entire viewscape regardless of operability. Values for maximum percentage of disturbance which would reflect those

applied in current practice and the KLRMP were determined using provincial guidelines for factoring visual resources into timber supply analyses. Four visual quality zones were modelled in the timber supply analysis: preservation, retention, partial retention and modification.

Public input submitted by SEAS and YEA expressed the concern that the green-up heights seem too short to effectively provide visual green-up. YEA added that there are no published attitude surveys that support the green-up heights used in the analysis. Further, YEA expressed the opinion that the LRMP guidelines used as a basis for the analysis were meant to introduce more retention and the use of selection silviculture to meet VQO objectives. BCFS staff respond by noting that the green-up heights used in the analysis are based on provincial policy and local knowledge, including specifications from the KLRMP. Each cutting permit in visually sensitive areas is reviewed prior to harvest to ensure an appropriate level of disturbance from a visual standpoint. Furthermore, the management strategies for visually sensitive areas as well as for visually effective green-up heights are in fact based on public perception surveys.

Input was also received from the forest industry and Shuswap Nation Tribal Council expressed the opinion that the VQOs in the lake management zone should be limited only to those parts of the 200-metre wide zone that are visible from the designated key viewpoint, and not applied to the entire zone. However, district staff indicate that the forest cover requirements applied throughout the lake management zone in the analysis were intended to approximate the impact of managing for other forest values within the zone, not just VQOs.

I have considered the input received regarding visually sensitive areas, and note that modeling of visually sensitive areas in the base case is consistent with the KLRMP. Further, I note that sensitivity analyses indicate that the timber supply is quite constrained in the base case harvest forecast by forest cover objectives for achieving visual quality. However, uncertainty in visual management does not impact the base case harvest forecast in the short term. Any future refinements can be taken into account in a future determination as appropriate. In the meantime, for the purposes of this determination, I am satisfied that the base case forecast has adequately addressed visual quality constraints as currently practised.

- recreation sites

In the analysis, two recreation sites were excluded from the timber harvesting land base – the designated Hudson's Bay Trail (103 hectares) and Sun Peaks Resort (383 hectares). District staff indicate that there is a heli-ski area currently under development in the Saddle Mountain area near Blue River, and while the final extent of the operation is unknown, the impact on the timber harvesting land base is expected to be insignificant. I am satisfied that the current reductions to the timber harvesting land base to account for recreation sites is appropriate. Any further developments can be incorporated into the next timber supply review.

The Kamloops Naturalist Club submitted the opinion that a recreation assessment needs to be undertaken for the TSA to explore expansion of recreation opportunities such as fishing camps and back-country recreation, while limiting the impact of logging operations.

Having reviewed the information about recreation in the Kamloops TSA, I am satisfied that the analysis assumptions regarding management for this resource were appropriate. I note that any further management requirements for recreation that arise in the Kamloops TSA can be incorporated into a future timber supply analysis. For this determination, I make no further adjustments.

- cultural heritage resources

Under the *Forest Act*, a cultural heritage resource means 'an object, a site or the location of a traditional societal practice that is of historical, cultural or archaeological significance to British Columbia, a community or an aboriginal community.' Archaeological sites contain physical evidence of past human activity, whereas traditional use sites may not necessarily contain historical physical evidence but may indicate current use by First Nations. Archaeological sites that predate 1846 are protected under the *Heritage Conservation Act*. The nature and extent of required protection of archaeological sites are detailed under this legislation.

In 1995, an archaeological overview assessment (AOA) was underway in the Kamloops TSA for the period 1995 to 2001. The AOA and associated procedures were revised in 2001 with the involvement and endorsement of the Shuswap Nation Tribal Council (SNTC), local First Nation communities, the Ministry of Forests, and local licensees. The new AOA procedures include maps which identify high to low ratings for potential archaeological sites, and if development is proposed in medium or high areas, then further office reviews and fields assessments are undertaken. Generally areas with low potential do not require further review unless justified. These revised AOA procedures are expected to be fully implemented this fall.

Public input received from Weyerhaeuser notes that a sensitivity analysis should be done using the current cultural heritage data and traditional use studies. There was no specific accounting for archaeological and traditional use sites in the derivation of the timber harvesting land base in the analysis. To date, approximately 1865 archaeological sites have been identified within the Kamloops TSA. After accounting for the exclusion of area to account for other factors, only 189 sites occur within the timber harvesting land base. District staff estimate that these identified sites cover approximately 150 hectares of the timber harvesting land base.

I note that identified cultural heritage areas occur on a very small proportion of the timber harvesting land base, and that many of these areas are situated in portions of the timber harvesting land base that are already constrained for other resource values. Nonetheless, I accept that there is a small overestimation of the timber harvesting land base due to this factor. I have accounted for this overestimation as discussed further, under 'Reasons for decision.' For the next determination I suggest that any specific data collected from the AOA regarding the occurrence of cultural heritage resources on the timber harvesting land base should be incorporated into the next timber supply review.

-caribou and deer habitat

Five wildlife zones were identified in the KLRMP -- early and late winter caribou habitat; caribou corridors; critical deer winter range; and critical moose winter range. District staff indicate that critical moose winter range has no timber supply implications; therefore, it was not modeled in the timber supply analysis. All other wildlife zones identified in the KLRMP were modeled to reflect the timber harvesting guidelines of the KLRMP. There is ongoing work regarding caribou habitat management as part of KLRMP implementation.

In the analysis, caribou late winter habitat areas require at least 33 percent of the productive forest land older than 140 years to maintain lichen production. In addition, approximately 5000 hectares of the caribou late winter habitat has been deferred to reflect a caribou research moratorium, and does not contribute to timber supply in the analysis for the first decade of projections. For caribou early winter habitat, at least 20 percent of the productive forest must be older than 140 years, and no more than 33 percent of the productive forest can be less than 3 metres in height. For caribou corridors, at least 30 percent of the productive forest must be greater than 20 metres in height to provide thermal cover, and no more than 20 percent can be less than 3 metres in height.

Both Weyerhaeuser and staff of the former Ministry of Environment, Lands and Parks (now with Ministry of Water, Land and Air Protection) commented on the old forest age for caribou habitat. MWLAP staff commented that the KLRMP specifies that 150 years is the appropriate mature cover age for caribou habitat only if it can be shown that adequate habitat containing caribou attributes would be left after logging of the second pass. Conversely, Weyerhaeuser submits that the mature cover age is intended to represent the age at which arboreal lichens and other old-growth attributes are present, and that stands will exhibit these characteristics as early as 120 years of age. In response to BC Environment's comment, I note that 140 years is a significant constraint; further, it is a minimum and whether or not stands are harvested at this age depends on what other forest management objectives constrain the areas. In response to both submissions, I note that the information used in the analysis reflects the guidelines described in the KLRMP, and represents the best available information. If research identifies a more appropriate age to represent caribou habitat requirements, it will be incorporated into future timber supply analysis.

Critical deer winter range is managed to maintain thermal cover. In the analysis, deer winter range needs were modelled by requiring at least 25 percent of the productive forest in stands greater than 75 years (representing the age at which stands reach 20 metres in height), and allowing a maximum of 20 percent of productive forest in stands less than 3 metres.

YEA submits that the LRMP-approved critical deer areas need to be revised as a result of expanding deer populations and changes in the location and condition of critical habitat. YEA also stated that critical habitat for moose and grizzly bear should be accounted for in the analysis, since it requires sensitive management. Regional staff indicate that some of these concerns are being addressed by the KLRMP monitoring table. In addition, the Identified Wildlife Management Strategy (discussed below under *identified wildlife*) may

address the grizzly bear issues raised by YEA. Any changes arising from these processes will be incorporated in subsequent timber supply analysis.

Additional public input received from the Kamloops Naturalist Club submitted that it is necessary to complete an inventory of wildlife and their habitats, and to outline provisions to protect them during logging and road construction. In response, regional staff indicate that the ongoing Caribou research will work to ensure habitat needs are met through silviculture system design and retention management practices. Furthermore, there are many other constraints applied in the analysis, such as for riparian or biodiversity, which in aggregate are intended to contribute to species' needs and maintenance of habitat.

MWLAP staff submitted a series of concerns about wildlife management in general. MWLAP commented that the regeneration assumptions outlined in the *Data Package and Information Report* signified that species conversion would take place, placing wildlife biodiversity at risk. For example, the removal of fir and cedar from stands eliminates key nesting trees, a source of deer food and coarse woody debris. Further, MWLAP expressed the concern that species replacing balsam and hemlock in regenerating stands would not provide live snag features as soon as would occur with the original stand species mix. However, I note that wildlife tree retention has been modelled in the analysis (discussed under *stand-level biodiversity*, below), and operationally, high-value trees such as fir, cedar and deciduous are being retained in cutblocks. MWLAP also commented that the regeneration assumptions represent a risk to wildlife because conversion to monocultures would increase the risk of epidemic disease and large fires. MWLAP expressed the opinion that species conversion assumptions did not take into account the potential for global warming for which drought-tolerant species such as yellow pine and fir might be preferred at lower elevations. MWLAP also noted that broad-scale conversion to introduced species such as larch and hybrid poplar could put wildlife biodiversity at risk. MWLAP stated that plans for moose, caribou and deer habitat outlined in the KLRMP are based on maintaining the natural mix of tree species. In response to these concerns about the impact of regeneration assumptions on wildlife habitat, I agree that the KLRMP limits the creation of monocultures and widespread species conversions through the objective to maintain forest species similar to existing stands across the landscape, and regional staff indicate that the analysis is consistent with the KLRMP. Regional staff further state that there is no conversion to larch or hybrid poplar species assumed in the analysis and operations on the ground are now reflecting the directions outlined in the KLRMP.

Having reviewed the information available about caribou and deer habitat, and the information submitted on risks to wildlife habitat, I am satisfied that the analysis reasonably reflects wildlife management requirements outlined in the KLRMP. Accordingly, I make no adjustments on this account for this determination, and look forward to any additional information which becomes available for future timber supply reviews.

- identified wildlife

Species and plant communities are identified as identified wildlife in the Forest Practices Code if it is believed their survival requires special management strategies. Several endangered, threatened, vulnerable and regionally significant species and communities that are not believed to be sufficiently protected under existing management strategies have

been established as identified wildlife under the provincial Identified Wildlife Management Strategy (IWMS). Existing management strategies include those for biodiversity, riparian areas, and ungulate winter range.

Volume I of the IWMS lists seventeen identified wildlife species that may occur in the Kamloops TSA: bull trout, rubber boa, racer, gopher snake ssp. deserticola, American bittern, northern goshawk, trumpeter swan, prairie falcon, long-billed curlew, Lewis's woodpecker, sandhill crane, Brewer's sparrow ssp. breweri, bobolink, fisher, grizzly bear, mountain goat, and bighorn sheep ssp. californiana. The second version of this compilation, which has yet to be released, may identify additional species and exclude some of the species identified in Volume I. Habitat requirements for the species identified in Volume I will be managed through the establishment of wildlife habitat areas (WHAs) and implementation of general wildlife measures (GWMs), or through other management practices specified in Forest Development Plans. No WHAs have yet been established in the Kamloops TSA. The analysis did not explicitly model any requirements for identified wildlife.

Based on data accumulated on the habitat requirements for the identified species, the estimated impact of management was projected at one percent of the short-term harvest level for the province. Government has committed to limiting the impact of management for identified wildlife to this level in the short-term.

It is not possible in this determination to specify the exact location or precise amount of additional habitat area that will be required within the timber harvesting land base to implement the IWMS. However, given the province's commitment both to implement the IWMS, and to limit short-term timber supply impacts to one-percent province wide, as well as the expected occurrence of identified wildlife in this TSA, I find it appropriate to account for a one percent impact on timber supply, and I will discuss this further under 'Reasons for decision.'

I encourage the appropriate staff to work to establish WHAs and implement GWMs prior to the next determination for the Kamloops TSA. The establishment of these areas is a significant protective measure of the Forest Practices Code, and will assist with long-term planning and reduce operational conflicts between wildlife and harvesting.

- riparian habitat

Riparian habitats occur along streams and around lakes and wetlands. The Forest Practices Code requires the establishment of riparian reserve zones (RRZs) that exclude timber harvesting, and riparian management zones (RMZs) that restrict timber harvesting, in order to protect riparian and aquatic habitats. Stream classes (e.g. S1) described in the *Riparian Management Area Guidebook* are determined based on presence of fish, occurrence in a community watershed and average channel width criteria. The stream class is used to estimate RRZs and RMZs requirements.

For the analysis, in order to account for management in riparian areas, district staff conducted a buffering and overlay process in a Geographic Information System (GIS) to deduct geographically-specific areas from the productive forest land base. RRZs and RMZ widths were calculated for each class of stream. RRZs were entirely excluded, and for

RMZs a percentage was calculated based on half the maximum basal area retention defined in the Riparian Management Guidebook and an equivalent area reduction was applied. Management around lakes and wetlands was accounted for using the same criteria.

MWLAP suggested that the percentages for volume retention in RMZs has been underestimated by half in the analysis. District staff confirm that it is current practice to retain the basal areas recommended as best management practice in the Riparian Management Guidebook. As a result, an additional 11 420 hectares of RMZs should have been excluded from the timber harvesting land base in the timber supply analysis. I have accounted for this overestimation of the timber harvesting land base as discussed further, under 'Reasons for decision.'

Input received from the Department of Fisheries and Oceans (DFO) expressed concern that the amount of area excluded from the timber harvesting land base for riparian areas may not reflect the amount of retention needed to protect stream ecosystems within the Kamloops TSA, particularly small fish-bearing streams and their direct tributaries. Some DFO staff had suggested that 100 percent basal area should be retained in RMZs for these small fish-bearing streams and their direct tributaries. Since the DFO submission was received, staff at the Ministry of Water, Land and Air Protection, BCFS and DFO have completed an audit of riparian practices. The resulting report, published jointly by these organizations, indicated that no significant problems with riparian management were found in the audit. The DFO has also worked with the BCFS to re-write the stream crossing guidebook and procedures. Accordingly, I am satisfied that the issues raised by the DFO have been resolved. Any future changes in riparian management practices can be reflected in future determinations.

The Skeetchestn Indian Band (SIB) reiterated the concerns raised by the DFO, and added that they are opposed to clearcut harvesting within 100 metres of riparian features, and strongly opposed to any harvesting within 20 metres of riparian features. They submitted that at least 50 percent of the volume within 100 metres of any riparian feature be retained in order to protect hydrologic function and fisheries. In response to these concerns, I am guided in my determination by the statutes in place, which are supported by field research. However, I am also guided by current practices in the field, and as noted above, the base case harvest forecast underestimates the amount of forest retained in RMZs. I have accounted for the resulting overestimation of the timber harvesting land base in my determination.

- community watersheds

There are 17 designated community watersheds and one community watershed within the Kamloops TSA, encompassing a total of 63 240 hectares or 6.4 percent of the timber harvesting land base.

An equivalent clearcut area (ECA) constraint was modelled in the timber supply analysis to reflect hydrological recovery rates, in accordance with the *Interior Watershed Assessment Procedure Guidebook* and the *Community Watershed Guidebook*. For the purposes of the timber supply analysis, the ECA constraint was approximated by allowing a maximum of

25.2 percent of the productive forest area in community watersheds to be covered by stands less than 6.6 metres in height.

Public input received from the Kamloops Naturalist Club (KNC), SEAS, and YEA expressed concern about the protection of watersheds. KNC emphasized that studies are needed on the impact on the Thompson River system of water runoff from heavy snowpacks on clear cuts combined with a rapid spring runoff. SEAS and YEA made numerous comments about watershed management, suggesting that ECA constraints should be modeled for high value fisheries watersheds, and domestic and irrigation watersheds, not just to designated community watersheds. SEAS and YEA also commented on the ECA constraints applied to community watersheds in the analysis, submitting that disturbance should have been modelled at the maximum of 20 percent less than 9 metres in height for the whole watershed. In response to these concerns, district staff indicate that all of the community watersheds have been assessed, and where potential problems were identified, remedial work was completed. District staff indicate that in general, no stream channel impacts were found even though in some cases, ECAs were at or above threshold levels.

Input received from Weyerhaeuser suggested that the ECA restrictions do not necessarily prevent further harvesting; rather, the ECA limit is intended to trigger further analysis which can ultimately permit further harvesting. Therefore, they suggested that a higher disturbance limit should be modeled. I acknowledge that reaching the ECA level in a watershed triggers a further watershed assessment but does not necessarily cause suspension of harvesting activity. However, I do not think it is appropriate to speculate that higher levels of disturbance will be acceptable. The ECA constraints are based on the best information available to hydrologists, and reflect the fact that community watersheds are subject to different management than non-designated watersheds. For the purposes of the timber supply analysis, I am satisfied that the constraints modeled are reasonable.

Weyerhaeuser also submitted that for the White River drainage, the designation as a community watershed is being cancelled. District staff indicate that a request has also been made to remove the community watershed designation for the Leonie Creek community watershed. In addition, district staff indicate that the community watershed designation for both Gill Creek and White River have been removed since the completion of the timber supply analysis. In total, district staff estimate that approximately 2815 hectares of timber harvesting land base currently modeled as community watersheds will no longer be managed as community watersheds. I am aware that the amount of area constrained as community watersheds is now smaller than reflected in the analysis; however, I do not believe that the timber supply will be significantly impacted by this difference, and therefore I make no adjustments on this account. Any additional information that comes available, such as refinement in techniques to model community watershed constraints, can be reflected in the next analysis for the Kamloops TSA. Finally, the next analysis and determination should reflect only those areas that are designated as community watersheds at that time.

- stand-level biodiversity

To provide habitat for the conservation and enhancement of wildlife and to help maintain stand-level biodiversity, wildlife tree patches (WTPs) and wildlife trees (WTs) are retained.

In the Kamloops TSA, retention of WTPs and WTs was represented by a 2.12 percent reduction in timber yield estimates. Estimates of volumes retained in WTPs and WTs in the Kamloops Forest District were based on assessment of silviculture prescriptions from the period of October 1996 to October 1997. Clearwater Forest District staff then adapted these Kamloops Forest District assessment results using professional judgement to arrive at an estimate of volumes retained for WTPs and WTs in the Clearwater Forest District. In areas of the Kamloops TSA where selection harvesting is practised, it was assumed that wildlife trees retained after harvests would meet stand-level biodiversity requirements, so no volume reduction was applied to yield estimates for these stands.

MWLAP staff commented that the use of wildlife trees and wildlife tree patches may reasonably approximate current practices, but that these requirements may decrease as old growth management areas (OGMAs) are finalized. I recognize that once OGMAs are delineated, a lower level of wildlife tree retention may be required. District staff indicate that they are maintaining interim OGMAs and appropriate wildlife tree retention levels as required by the KLRMP at this time. I encourage district staff to continue to monitor the level of WTP retention actually practiced, so that the implications to timber supply can be assessed again during the next timber supply review.

I have considered the information regarding stand level biodiversity. I am satisfied that it has been adequately accounted for in the base case, and I will make no further adjustments in this regard.

- landscape-level biodiversity

Achieving landscape-level biodiversity objectives involves maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures, across a variety of ecosystems and landscapes. Managing for biodiversity is based in part on the principle that this—together with other provisions in the Forest Practices Code, such as riparian management, maintenance of wildlife trees, and other forest cover objectives as discussed throughout this document—will provide for the habitat needs of most forest and range organisms. A major consideration in managing for biodiversity at the landscape level is leaving sufficient and reasonably located patches of old-growth forests for species dependent on, or strongly associated with, old-growth forests.

The delineation and formal designation of 'landscape units' is a key component of a sub-regional biodiversity management strategy. For the Kamloops TSA base case, percentage requirements for old-forest retention were based on interim biodiversity emphasis options (BEOs) assigned in the KLRMP for each landscape unit.

Another aspect of current biodiversity management policy is that mature-seral requirements should not be implemented if they would have a timber supply impact. Sensitivity analysis shows that applying requirements for mature forest as well as those for older forest reduces medium-term timber supply slightly, but does not decrease short-term timber supply. This result may assist in landscape unit planning and guide decisions made under the KLRMP, but as discussed previously, the modelling approach in the base case follows existing policy, and I will make no related adjustments.

MWLAP staff cautioned that any increase in the AAC must be examined carefully for

impacts on landscape level biodiversity and stand level biodiversity. For example, if the size of the timber harvesting land base is increased due to the continuation of the cedar and hemlock partition beyond what was modeled in the base case, there will be a greater pressure on stands within the timber harvesting land base to meet old seral requirements. In response, I note that any increase in the AAC would be contemplated in accordance with guidelines for landscape level biodiversity and wildlife tree retention, as directed by the KLRMP.

Public input received from SEAS and YEA questioned the source of the forest cover information for parks and the reliability of the information. Regional staff indicate that, since many existing parks used to form part of the Kamloops TSA, the park forest cover information is of the same quality and reliability as the rest of the forest cover information used in the analysis. SEAS and YEA also expressed the concern that areas with no forest typing information available (type identity 8 areas) should not be allowed to contribute to biodiversity requirements in the analysis. Regional staff assure me that in the analysis, these type identity 8 areas did not contribute to biodiversity requirements, or to any other forest cover requirements.

Additional input from SEAS and YEA indicated that wildlife tree patches in the Kamloops TSA should not be considered to contribute to landscape-level biodiversity since they are likely too small to provide the appropriate forest conditions. However, I note that in the analysis, wildlife tree retention was modelled as a volume reduction to the yield curves, and as a result, there was no contribution of wildlife tree patches to landscape-level biodiversity requirements. Furthermore, district staff indicate that operationally, some WTPs exceed 2 hectares and could therefore be considered to contribute to landscape-level biodiversity. I encourage district staff to monitor the size of wildlife tree patches so their contribution to landscape-level biodiversity requirements can be accounted for in the next timber supply analysis.

Licensees stated that riparian management zone areas excluded from the timber harvesting land base should not be considered to meet old seral requirements. In response, I acknowledge that these RMZs are assumed to contribute to landscape level biodiversity in the analysis; however, district staff indicate that this assumption may be appropriate in some cases since the RMZ will be left intact following harvest and could be used to meet seral stage requirements.

SEAS and YEA expressed the opinion that if protected areas around the TSA are used to contribute to landscape-level biodiversity, then the old seral requirements should be increased to compensate for the fact that the requirements are based on the assumption of having 12 percent of the area in old growth within protected areas. YEA commented that the analysis should take into consideration the shortfall where old seral forests in protected areas are unable to meet the full requirements. YEA added that many protected areas include rock, ice and snow, and that many subzones do not have 12 percent protection at this time. In response, I note that, in accordance with provincial policy outlined in *Higher Level Plans: Policy and Procedures*, the forests in adjacent protected areas (with the exception of Wells Gray Park, discussed below) are considered to contribute to meeting seral stage requirements for landscape level biodiversity, if the planned management for these areas is consistent with the maintenance of the objectives. Where the seral stage

requirements are not met by the forests within protected areas, the timber harvesting land base must be used to meet the requirements. I further note that only the forested portions of protected areas are assumed to contribute to these requirements. I am satisfied that, in this regard, seral stage requirements have been modelled consistently with the provincial policy direction for achieving landscape level biodiversity requirements provided in the *Landscape Unit Planning Guide* and the KLRMP.

Regional staff indicate that in the analysis, Wells Gray Provincial Park was not considered to contribute to landscape-level biodiversity requirements. Most of this park lies outside any landscape unit, and since landscape-level biodiversity requirements are applied within landscape units, regional staff believed that tracking the biodiversity contribution of this park in the analysis would not have a significant impact on timber supply. Nonetheless, I believe it is possible that forests within Wells Gray Provincial Park could offset the impacts of managing mature and old seral forest requirements, and I encourage the examination of this issue prior to the next timber supply review for Kamloops TSA.

For the base case harvest forecast, it was assumed that forests outside the timber harvesting land base will continue to age over time so that, eventually, they will all be classified as old seral. This modelling approach was taken because modelling of natural disturbance and succession is complex and subject to much uncertainty. Public input received from forest industry representatives, SEAS and YEA expressed the opinion that significant unsalvaged losses are likely to occur in the inoperable and protected areas that contribute to biodiversity. They suggested that sensitivity analysis should be completed to examine the potential timber supply implications of disturbance in these areas. I agree that it is reasonable to expect that forest in the Kamloops TSA, including that outside the timber harvesting land base, will be subject to disturbance. The assumption in the base case would therefore lead to an optimistic assessment of the role of forest outside the timber harvesting land base (that is, non-contributing forest) in achieving biodiversity objectives. For a sensitivity analysis, it was assumed that the existing age class composition for forests outside the timber harvesting land base would remain the same as the current distribution (in other words, that disturbances would offset the ageing of the forest). In this case, the length of time that initial harvest level can be maintained would be reduced by two decades, and the long-term harvest level would decrease by 3.5 percent.

I believe that the base case modelling assumption that forest outside the timber harvesting will age continuously resulted in an overestimate of long-term timber supply. The magnitude of overestimate is unknown given uncertainty about the disturbance rate and pattern, however, analysis suggested the long-term level may be overestimated by as much as 3.5 percent in the base case. I will discuss this further in 'Reasons for decision.'

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

Kamloops Land and Resource Management Plan (KLRMP)

District staff indicate that the KLRMP is being implemented, and there is a KLRMP monitoring table in place to provide input on issues and ensure that stakeholder goals are

met. Monitoring reports are prepared annually to review implementation issues, and the 1999 Monitoring Report indicates that the goals and objectives of the KLRMP are being met. I have considered the information about the KLRMP as I have reviewed each of the factors for my determination, and I am satisfied that what was modelled in the analysis is consistent with the KLRMP.

First Nations considerations

Five First Nations have asserted traditional territories within the Kamloops TSA: the Secwepemc, Nlaka' pamux, St'at'imc, Okanagan, and South Carrier First Nations. There are ten First Nation communities within the TSA with a total population of about 5000 people: Adams Lake, Ashcroft, Bonaparte, Kamloops, Little Shuswap, North Thompson, Neskonlith, Oregon Jack, Skeetchestn, and Whispering Pines.

In addition, nine First Nations communities reside outside the Kamloops TSA, but have asserted traditional interests within the TSA. These include: High Bar, Spallumcheen, Lower Nicola, Upper Nicola, Xaxl'ip (Fountain), Ts'kw'aylaxw (Pavilion), Cook's Ferry, Lheidli T'enneh Nation and Canim Lake.

With the exception of Canim Lake and Lheidli T'enneh First Nations, the First Nations groups associated with the Kamloops TSA are not involved in the Treaty process. The Ministry of Forests and First Nations address forest resource management issues and concerns as outlined in protocol agreements, and as discussed in work groups and various monthly meetings. Four First Nation communities are involved with protocol agreements regarding forest operational planning: Canim Lake (2000-2001), Little Shuswap (2001), Ts'kw'aylaxw (1999-2001), and Upper Nicola (1999-2001). Another protocol agreement has been initiated with the Bonaparte Band.

All of the mentioned First Nations were provided with copies of the data package, information report, analysis report and the public discussion papers, and were invited to provide their comments. Input was received from First Nations on the data package and information report, and on the timber supply analysis, socio-economic analysis and public discussion paper.

Two submissions were received from the Shuswap Nation Tribal Council (SNTC) relating to the November 1998 data package and information report. The SNTC noted that information gaps in traditional use and cultural resource inventories may make it difficult to manage and protect their interests. To prevent the infringement of their title and rights, the SNTC stated that meaningful consultation and the informed consent of the tribal council in resource allocation decisions is needed. They also commented that they oppose the Timber Supply Review process because it fails to consider the Delgamuukw decision. The SNTC added that resource allocation decisions in the absence of proper consultation and the informed consent of the tribal council will be treated as a breach of the Crown's fiduciary duty, and will be contested as such. The SNTC also requested funding for a Registered Professional Forester and for conducting Traditional Use Studies to enable First Nations to make their participation in the timber supply review process more meaningful, given the very technical nature of the process.

The second submission from the Shuswap Nation Tribal Council relating to the data package and information report noted the lack of complete resource inventory and traditional use data, and says the province has a duty to consult with First Nations on issues of infringement of aboriginal rights and title. They expressed the belief that a timber supply analysis that is focussed and based on large-scale timber extraction is a narrow approach.

Having considered the input and concerns carefully, and relying on my authority to address matters within my jurisdiction as chief forester in making an AAC determination for the Kamloops TSA by considering the provisions of section 8 of the *Forest Act*, my responses are as follows.

Regarding the SNTC's concerns about the information gaps in traditional use and cultural resource inventories, and the impact of harvesting on aboriginal rights and title, water, fish, traditional use, heritage resources, and spiritual sites, I respond that the best available information has been used as a basis for this determination. I also note that Traditional Use Studies (TUSs) have been completed for nine of the First Nations communities: Bonaparte/Skeetchestn, Kamloops, North Thompson (in the Clearwater Forest District), Neskonlith/Adams Lake, Little Shuswap, and the Nicola Tribal Association. Approximately 80 percent of the TSA has been covered by TUSs. I have also accounted for the results of ongoing archaeological overview assessment work in my determination, as discussed above, under *cultural heritage resources*. Nevertheless, I recognized that concerns remain regarding data gaps in the TUS information. I also note that there are similar concerns about accounting for cultural heritage resources. Once implemented, the revised AOA procedures are expected to enable the direct involvement of contractors from the First Nations community in archaeological assessments and this will further improve the identification of cultural heritage resources. I further note that the analysis has accounted for other resource considerations such as riparian and wildlife habitat consistent with the KLRMP, and significant portions of the productive forest have been excluded from the timber harvesting land base to protect non-timber resources. I believe inasmuch as information on traditional use, cultural resources, and other resources is available, it has been accounted for in this determination. If more information becomes available, I will consider it in future AAC determinations. I suggest that BCFS continue to develop a good working relationship with the First Nations to ensure non-timber resources are managed appropriately and to address concerns for future AAC determinations.

Regarding the SNTC's request for funding, while I appreciate the concern about understanding the technical data in the timber supply analysis, I am unable to either provide or direct funding for developing technical expertise.

With respect to the issue of meaningful input and the infringement of title, I am aware that the First Nations mentioned in the first paragraphs of this section have asserted title or expressed traditional interests relating to areas within the Kamloops TSA. Many of the claims overlap geographically. Given information available to me, I am uncertain of the extent of timber supply implications, if any, for the TSA that these expressed interests may have. Based on my knowledge of and familiarity with the technical details of timber supply forecasts, I assert that changes in timber supply do not always translate into AAC impacts in the short term. As such, I am confident that, based on the nature of the base case, the

Kamloops TSA timber supply is sufficiently robust to absorb the uncertainty respecting aboriginal title until such time as further clarity is gained. I note that my determination does not diminish the district managers' responsibility to consider aboriginal rights and title as part of operational planning.

The SNTC expressed a desire to have a greater role in the forest industry, including harvesting rights and revenue sharing. With respect to opportunities for including First Nations in the economic benefits of timber harvesting, either in joint ventures with existing licensees or in other forms of tenure, these are matters for consideration by the Minister of Forests with respect to the apportionment of the AAC I am now determining, rather than by me as chief forester in the determination of the AAC itself.

Only one submission was received on the July 2001 analysis report. As discussed above, under *riparian habitat*, the Skeetchestn Indian Band expressed the concern that riparian habitat requirements are not adequately accounted for in the analysis, and stated that they are opposed to clearcut harvesting within 100 metres of any riparian feature, and any harvesting within 20 metres of a riparian feature. As discussed under *riparian habitat*, I am guided in my determination by existing law and forest management guidelines, which are supported by field research. Nonetheless, I have concluded that the base case harvest forecast underestimates the amount of forest currently retained in RMZs as specified in the *Riparian Management Area Guidebook*, and I have accounted for this in my determination.

Based on my considerations documented above, I will make no adjustments to the timber supply with respect to First Nations issues at this time. Any decisions on treaty negotiations with the First Nations that are undertaken by government will be reflected in future AAC determinations for the TSA. The AAC that I determine should not in any way be construed as limiting the Crown's legal obligations resulting from recent court decisions, including those in the Supreme Court of Canada, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the Kamloops TSA.

Adams Lake Innovative Forestry Practices Agreement

The Adams Lake IFPA area comprises approximately 180 000 hectares in south central British Columbia. The IFPA area encompasses, for the most part, the watershed of Adams Lake extending to Running Bear Lake in the north and Little Shuswap Lake in the south. The IFPA area is located in the Clearwater and Kamloops forest districts within the Kamloops Forest Region. The community of Adams Lake lies within the IFPA.

The Adams Lake IFPA was issued to International Forest Products Ltd. Adams Lake Lumber Division (IFPA holder) in November 1997. A forestry plan was submitted in April 2000 and approved by the regional manager with conditions in August 2000. On June 25, 2001, the IFPA holder applied to the regional manager for an allowable annual cut increase as allowed under section 59.1 of the *Forest Act*. Section 59.1 of the *Forest Act* enables the regional manager to increase the current allowable annual cut associated with the IFPA. Prior to such approval, the regional manager must have approved a forestry plan in which the innovative forestry practices or activities are identified. Further, the increase must be justified based on timber supply analysis methodology approved by the chief forester.

Within the IFPA boundaries are the operating areas of Adams Lake Lumber, Gilbert Smith Forest Ltd., the Clearwater and Kamloops Forest District small business forest enterprise programs and operators in the old cedar- and hemlock-leading partition. The IFPA holder has obtained letters of support and agreements with other licensees within the IFPA boundaries with respect to the management of their operating areas and any increase in allowable annual cut related to the IFPA.

The regional manager carefully considered the IFPA analysis, examining each of the factors influencing timber supply availability and associated uncertainties. Based on these considerations, the regional manager determined on July 31, 2002 that 14 870 cubic metres per year is available from within the Adams Lake IFPA boundaries, which would not have been known or made available within the current allowable annual cut for the Kamloops TSA. I have reviewed the information upon which the regional manager based his decision, and have contemplated how this information relates to the TSA as a whole. I have accounted for the regional manager's decision as discussed below, under 'Reasons for decision.'

Deferrals and delays

In the previous timber supply review, the Robertson, Maiden, Finney-Chipuin and Hat Creek areas were identified as drainages where harvesting activities had been deferred due to First Nations concerns. Harvesting activities are presently limited to harvesting for forest health reasons, although West Fraser is pursuing an agreement with First Nations to proceed with harvesting in these areas.

In addition, harvesting in the Hiuihill and Gold Creek areas is still deferred, although Interfor intends to present information supporting the resumption of harvesting in these drainages. District staff note that if harvesting is resumed in Gold Creek, it will likely take place at a reduced rate.

In total, these deferred areas represent approximately 36 080 hectares of area within the Kamloops TSA. A further 400 hectares are set aside in permanent sample plots, which were assumed to contribute to the timber harvesting land base in the analysis. Deferred areas represent approximately 3 percent of the total TSA area. Regional staff indicate that these deferrals do not pose a significant risk to short-term timber supply because there is some indication that these areas will be accessed rather than deferred or permanently set aside.

YEA submitted that the Vavenby pine forest, Mount Olie, and the Cook Creek proposed protected area should be deferred because the KLRMP recommended some level of protection for these areas. However, district staff indicate that land use proposals for these areas were reviewed by Cabinet in 2001, and the approved plan included these areas in the General Resource Management Zone of the KLRMP, with special management strategies for wildlife and recreation. Since the analysis has incorporated the wildlife and recreation assumptions directed by the KLRMP, I am satisfied that these areas have been appropriately accounted for in the analysis.

Public input from SEAS and YEA expressed the opinion that deferred areas should be excluded from the timber harvesting land base in the timber supply analysis. I note that deferred areas, other than those noted above that have not been approved to become protected areas, and are expected to be accessed over time rather than continually deferred or permanently set aside. As such, I accept that the analysis assumptions regarding these areas were appropriate, as no formal land use decisions have been made about the status of these areas that would enable me to exclude them from contributing to timber supply. I am satisfied that these matters do not introduce unacceptable risk to the analysis. Any future land use decisions affecting these areas will be reflected in future timber supply analyses for the TSA.

Harvest sequencing

One assumption that must be made when modelling timber supply is how priorities are set for choosing eligible stands (i.e., those above minimum harvestable age and not needed for other values) for harvest. The harvest sequence can be set using a variety of options. The three most common are, oldest first (absolute or relative to the minimum harvestable age), youngest first (after some minimum age requirement) and random.

In the analysis, the relative oldest first harvest priority rule was used. Public input submitted by YEA expressed the concern that giving harvest priority to old forests is not always appropriate. District staff also indicate that in practice, numerous determinants affect which stands are available for harvesting which creates the need for flexibility in harvesting some stands which are not the oldest available. Therefore, actual practice is most likely slightly more random than assumed in the base case.

Sensitivity analysis compared forecasts resulting from application of youngest first and oldest first priorities to the base case (relative oldest first). Results showed that the oldest first rule resulted in the highest forecast in the long term (approximately 0.4 percent higher than in the base case). If the youngest first rule is applied, the initial harvest level of the base case could be achieved for fifty years before declining to 8 percent below the long-term harvest level of the base case. In both sensitivity analyses, short-term supply remained unchanged from the base case. Therefore, while the impact of current operational priorities relative to the base case is not precisely quantifiable, the analysis indicates that deviation from scheduling oldest stands first would reduce timber supply.

I note that when using the relative oldest rule that harvesting proceeds only after all other constraints and objectives have been met in the model. Nonetheless, I believe that it is likely that operationally there will be deviations from a relative oldest first priority (trending more towards a random harvest rule). Therefore, it is likely that medium- to long-term timber supply will be lower, but to an undetermined amount, than indicated in the base case. I will consider this further under my 'Reasons for decision'.

(b) the short- and long-term implications to British Columbia of alternative rates of timber harvesting from the area,

Alternative rates of harvest

The nature of the transition from harvesting old growth to harvesting second growth is a major consideration in determining AACs in many parts of the province. In the short term, the presence of large volumes of older forests often permits harvesting above long-term levels without jeopardizing the sustainability of future timber supply. In keeping with the objectives of good forest stewardship, AACs in British Columbia have been and continue to be determined to ensure that current and medium-term harvest levels will be compatible with a smooth transition toward the usually (but not always) lower long-term harvest level. Thus, timber supply should remain sufficiently stable so that there will be no inordinately adverse impacts on current or future generations. To achieve this, the AAC determined must not be so high as to cause later disruptive shortfalls in supply nor so low as to cause immediate social and economic impacts that are not required to maintain forest productivity and future harvest stability.

The base case represents only one of several harvest forecasts that could be achieved for the Kamloops TSA given the current management regime and objectives. The *July 2001 Kamloops Timber Supply Area Analysis Report* outlines an alternate forecast, which shows the highest first decade harvest that would be achievable if declines are limited to 10 percent per decade and the long-term harvest level is not jeopardized. Under these conditions, the initial harvest level could be as high as 3 126 000 cubic metres, approximately 15 percent higher than in the base case. This alternative harvest forecast provides me with an indication of the stability of the short- to mid-term timber supply for the TSA, and suggests that the timber supply is sufficiently stable to offset short-term downward pressures.

I have reviewed the alternative harvest forecast provided, and I am satisfied that the harvest flow selected for the base case provides the most suitable forecast of timber supply, and provides a suitable basis from which to evaluate the assumptions applied in the analysis.

Community implications

I have reviewed the information presented in the socio-economic analysis for the Kamloops TSA, and I am aware of the implications to communities of changes in the harvest levels for the TSA.

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

Timber processing facilities

I have reviewed the information regarding timber processing facilities, and I am mindful of the reliance of timber processing facilities on the volume harvested in the Kamloops TSA.

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia,

Minister's letter and memorandum

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester--a letter dated July 28, 1994, (attached as Appendix 3) and a memorandum dated February 26, 1996, (attached as Appendix 4). The letter and memorandum include objectives for forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability.

The Minister stated in his letter of July 28, 1994, that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. To encourage this the Minister suggested consideration of partitioned AACs.

I have considered the contents of the letter and memorandum in my determination of an AAC for the Kamloops TSA.

Local objectives

The Minister's letter of July 28, 1994, suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives. Many public responses were received regarding the information report and data package, and the timber supply and socio-economic analyses.

I have considered all public input received on the timber supply review. Wherever possible, I have attempted in this rationale to respond briefly to the views expressed in the public input, and consideration of this input has been an important component of this determination. Some of the input was related to considerations outside of my authority to consider under section 8 of the *Forest Act*; for instance, under the Act the nature and viability of specific tenure arrangements are the responsibility of the Minister of Forests. For example, the Kamloops Naturalist Club submitted that the AAC determination and

forest management should be based on small sustained yield units to allow the process to be more sensitive to local conditions and to promote economic stability. While it may be possible to identify a theoretically sustainable cut for a portion of a TSA, if implemented this could significantly affect the scale of operations in other parts of the TSA, and under the *Forest Act* I have the authority to determine AACs for entire TSAs or TFLs only. The summary of public input is reproduced in full as Appendix 5.

The KLRMP, the intent of which forms current practice in the Kamloops TSA and has been accounted for in this determination, was approved after years of public dialogue and negotiation. The Higher Level Plan Order was established by government in 1996, and provides further clarification for some objectives as they continue to be interpreted and implemented. These objectives, as well as the local objectives raised through public input, have been an important consideration in my determination of an AAC for the Kamloops TSA.

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Unsalvaged losses

Unsalvaged losses are timber volumes destroyed or damaged by agents such as fire and disease that are not recovered through salvage operations. A number of insects, parasites, fungi or plants can kill trees or degrade the quality and value of logs. Estimates for unsalvaged losses account for epidemic (abnormal) infestations on the timber harvesting land base that are not incorporated into yield estimates used in the analysis. Timber volume losses due to insects and diseases that normally affect existing stands (endemic losses) are generally accounted for in inventory sampling for existing timber yield estimation or through other methods. Endemic losses associated with second-growth stands are addressed under *operational adjustment factors*.

In the analysis for the Kamloops TSA, 62 590 cubic metres per year in unsalvaged losses were assumed at the start of the analysis horizon. Of this amount, 3 900 cubic metres were attributable to bark beetles, a further 36 130 cubic metres to hemlock looper and other defoliators, 9 250 cubic metres to wind damage, 12 210 cubic metres to fire, and 1 100 cubic metres to miscellaneous causes. The unsalvaged losses estimates were based on the 1998 Unsalvaged Losses report.

District staff indicate that approximately 67 percent of the AAC has been directed at mountain pine beetle control, and the current infestation is manageable. However, they caution that there is a risk the population will grow to a level that cannot be managed within current harvest levels. A significant portion of the TSA is covered by stands of an age and species vulnerable to attack, and if the infestation becomes a more significant problem, more harvesting in the TSA will have to be directed to salvaging dead trees and removing infested trees. If the infestation is not manageable within the AAC, I will consider an uplift. At present, no uplift is required, but I expect BCFS staff to carefully monitor infestations levels and salvaging activities to ensure the infestation is being appropriately managed. If necessary, this determination can be revisited sooner than in

5 years.

Public input from the SEAS and YEA submitted that losses in plantations associated with weevils and root rot should be accounted for in the analysis. I note that losses due to such pests as root disease are accounted for in the analysis through operational adjustment factors, discussed above under *operational adjustment factors*. YEA and SEAS also submitted that windthrow and sunscald are serious causes of timber mortality and stem quality defects at the edges of most clear cuts, and that adjacent stands of mature timber are also impacted by root rots that increase in the adjacent clear cut. In response, I note that windthrow impacts are included in unsalvaged losses estimates. In addition, district staff indicate that sunscald usually affects shade tolerant understory trees, and most mature trees recover quickly from sunscald. With respect to the concern about root rot issues, district staff agree that root rot issues are not well understood, but note that treatment of root rot centres in machine-accessible stands is a silvicultural prescription obligation. Overall, BCFS staff believe the impact of these factors raised by SEA and YEA to be minimal.

SEAS and YEA also recommended that a sensitivity analysis should be completed to assess the impact of climate change on timber supply, since recent fires and increased insect infestations are already having an impact. In response to this input, I note that as long as permanent sample plots and temporary sample plots established for growth and yield estimation continue to be assessed, they will reflect impacts attributable to climate change. Similarly, the inventory updates will reflect climate changes. Accordingly, the growth and yield impacts of climate change or climate cycles would be accounted for through the Timber Supply Review process.

Weyerhaeuser submitted the opinion that the volume left in reserves from the Frogmoore Fire should not be considered unsalvaged losses but should be attributed to the biodiversity analysis impact. Regional staff indicate that the unsalvaged losses for fire were estimated using a ten-year average, and as a result, the contribution of the Frogmoore Fire to the overall average would be very small.

I have reviewed the information provided on unsalvaged losses, and I am satisfied that losses were appropriately accounted for in the reference harvest projections, with one notable exception: the losses attributed to hemlock looper.

Additional public input received from Weyerhaeuser expressed the opinion that the volume losses assigned to defoliators must be substantially reduced because the hemlock looper losses in the North Thompson are limited to the partitioned cedar and hemlock stands and are part of the harvest profile there. In response, district staff indicate that hemlock looper losses occur in all hemlock stands, not just in those stands identified in the partition. Nonetheless, I note that if the full volume of hemlock looper unsalvaged losses continue to be deducted from the timber supply even after the cedar and hemlock partition portion of the land base is removed from the timber harvesting land base after a decade, then the impact of hemlock looper on the timber harvesting land base is overestimated in the analysis. District staff estimate that hemlock looper represents 95 percent of defoliator unsalvaged losses. Therefore, hemlock looper results in approximately 34 000 cubic metres of unsalvaged losses annually. Regional staff indicate that there are approximately

60 000 hectares of hemlock-dominated stands initially included in the timber harvesting land base, of which 50 000 hectares are subject to the cedar and hemlock partition. After one decade in the analysis, the portion of the partition that has not yet been harvested (40 000 hectares, or two-thirds of all hemlock-dominated stands) is removed from the timber harvesting land base. These removed stands are associated with up to two-thirds of the unsalvaged losses associated with hemlock stands. Thus, assuming these stands are excluded from the long-term timber harvesting land base, unsalvaged losses have been overestimated in the analysis by up to 28 000 cubic metres after the first decade. I have accounted for this below, under 'Reasons for decision'.

Reasons for Decision

In reaching my AAC determination for the Kamloops TSA, I have considered all of the factors presented to me, and I have reasoned as follows.

A base case prepared as part of the timber supply analysis projected that the conventional portion of the harvest could be maintained at the initial harvest level of 2 361 900 cubic metres for the next 70 years. After 7 decades, the harvest level would then have to decrease by approximately 5 percent to the long-term harvest level of 2 246 000 cubic metres per year. In addition, the base case projected that the harvest from the partition for cedar and hemlock stands could be maintained for another decade until the licence for harvesting in these stands expires. The partitioned harvest for PA 16 could be maintained for 2 decades.

Section 8 of the *Forest Act* requires me to consider a number of factors in the determination of an AAC for a timber supply area. In determining an AAC, my considerations identify factors which, when considered separately, indicate that the timber supply may actually be greater or less than that projected in the base case. Some factors can be quantified and their impacts assessed with some reliability. Others may influence timber supply by introducing an element of risk or uncertainty to the decision, but cannot be reliably quantified at the time of the determination.

I am satisfied that the assumptions applied in the base case of the analysis for the majority of the factors applicable to the Kamloops TSA were appropriate. Following is my consideration of those factors for which I consider it necessary in this determination to take into account implications to the timber supply projected in the base case.

Factors which indicate that the timber supply projected in the base case harvest forecast may be underestimated are as follows:

1) *unsalvaged losses* – if stands included in the cedar and hemlock partition are excluded from the timber harvesting land base following the expiry of the licence in approximately a decade, then the unsalvaged losses attributable to hemlock looper that affect the timber harvesting land base have been overestimated in the analysis by up to 28 000 cubic metres after the first decade of the harvest projection;

2) *areas associated with PA 16 and the cedar and hemlock partition* – these areas represent approximately 7 percent of the initial timber harvesting land base, but over the next several decades are assumed to be excluded from the timber harvesting land base as the associated licences expire. I note that it is likely that forest development will continue to some degree in some of these excluded stands following the expiry of these licences. However, it is uncertain how much of this area should be considered to contribute to the future timber supply, but it is unlikely that all of these stands will be available for harvest in the long term because some are comprised of extremely decadent cedar and hemlock. Additionally, as discussed above under *decay, waste and breakage*, there is some indication that the incidence of decay in old cedar and hemlock stands may be up to 50 percent higher than assumed in the analysis. Also, it is noted that many of the PA 16 stands have very low timber growing potential. The exact magnitude of the land base underestimation as the result of excluding these stands from the long-term timber harvesting land base is uncertain, although the maximum is 7

percent, which could increase the medium- to long-term timber supply;

3) *utilization standards* – utilization standards for coniferous stands in PA 16 are higher than what was modelled in the base case. The standard for minimum diameter at breast height (dbh) assumed in the analysis for PA 16 was 12.5 centimetres, whereas current practice is to harvest all stems larger than 7.5 centimetres dbh. This has a small, unquantified upward impact on short-term and long-term timber supply;

4) *site productivity* -- I am satisfied that the productivity of second growth forests will be greater than indicated by site indices derived from existing old growth forests. The exact magnitude of this underestimation is uncertain. In the portions of the TSA outside the Adams Lake IFPA, I believe the underestimation may be as great as 5.5 percent in the short term and 11 percent in the long term. For areas within the IFPA, I accept that site indexes have been underestimated as indicated in the IFPA analysis, modified by the recognition that these site indexes will not be realized in higher elevations. I have discussed this factor further below, under Adams Lake IFPA;

5) *genetic gain* -- I accept that the level of select seed use in current operations, which was not accounted for in the base case harvest forecast, indicates that medium- and long-term timber supply is up to 2.5 percent greater than in the base case.

Factors which indicate that timber supply projected in the base case may be overestimated are as follows:

1) riparian habitat -- an additional 11 420 hectares of RMZs should have been excluded from the timber harvesting land base in the timber supply analysis. Thus, short- and long-term timber supply has been overestimated in the base case by approximately 1 percent;

2) cultural heritage resources – the base case did not account identified archaeological sites that cover an estimated 150 hectares of the timber harvesting land base. This represents approximately 0.15 percent of the timber harvesting land base, so the impact on timber supply is not significant;

3) identified wildlife -- I accept that the implementation of the IWMS, including identification of wildlife habitat areas and attainment of general wildlife measures, will result in an impact to the timber harvesting land base in the TSA of up to 1 percent over the entire analysis horizon;

4) harvest sequencing -- a relative-oldest-first harvest priority was applied in the base case. However, I believe that it is likely that operationally there will be deviations from a relative oldest first priority. Sensitivity analysis suggested that deviation from the relative-oldest first priority would most likely result in an unquantified but likely downward influence on medium- and long-term timber supply;

5) *operational adjustment factors* – the impact of root rot on timber supply has likely been underestimated, particularly with regard to growth projections of Douglas-fir. This represents a downward influence on medium- and long-term timber supply that is less than 5 percent;

6) *landscape-level biodiversity* -- in the base case it was assumed that forest outside the

timber harvesting land base would age continuously. Since all forest is subject to natural disturbance, the contribution of forest outside the timber harvesting land base to old-seral requirements has been over-estimated in the base case. This factor therefore places a downward influence on long-term timber supply of an uncertain amount; however, analysis indicated the influence could be as much as 3.5 percent over the long term. Medium-term timber supply would also be decreased.

The factors acting to increase the short-term timber supply — unsalvaged losses, PA 16 and cedar and hemlock partition areas, utilization standards and site productivity — together account for between 1 and 10 percent. The downward pressures in the short term include riparian habitat, cultural heritage resources and identified wildlife species. They account for about a 2.15 percent reduction.

Therefore, the uncertainty in short-term timber supply from those factors that can be quantified ranges from an overestimation of approximately 1 percent, to an underestimation of approximately 8 percent. I note that the main sources of uncertainty in the short term are site productivity and the cedar and hemlock land base. After a review of these factors, I believe that the site productivity for second-growth stands is clearly underestimated for those sites currently occupied by stands older than 140 years of age, and that it is very likely that at least some of the stands within the cedar and hemlock partition and PA 16 will continue to be available for harvesting after the expiry of the associated licences. Therefore, I conclude the uncertainty about the short-term timber supply is closer to the higher end of the range (8 percent) than it is to the lower end.

With respect to the combined influence of the downward pressures, I note that the upward pressures, combined with the observation that an alternative harvest forecast showed that the timber supply can support an initial harvest level that is 15 percent higher than in the base case, suggests that the timber supply is more than sufficiently stable to offset these short-term downward pressures. Additionally, I am mindful that the upward influences on the short-term timber supply in the Kamloops TSA are not enough to warrant an increase in the AAC to this degree. The harvest forecast projects a decreasing flow of timber over time, and it would be inappropriate, in the absence of compelling forest management reasons, to increase the AAC only to have to reduce it later. Instead, I consider these upward influences to offset the downward pressures and numerous risks to short-term timber supply detailed above.

In the long term, the factors acting to increase the timber supply include the land base for PA 16 and the cedar and hemlock partition, the use of improved seed, increased site productivity and higher utilization standards, which together account for an increase that could be as much as 20.5 percent. The downward pressures include riparian habitat, identified wildlife species, disturbances outside the timber harvesting land base that affect landscape-level biodiversity, and operational adjustment factors, for a total reduction of no more than 10.5 percent in the long-term. The net effect is an increase in the long-term harvest level of about 10 percent. A significant portion of this net effect is attributable to increased estimates of site productivity. I view the likelihood of higher timber productivity as a major stabilizing factor on medium and long-term timber supply in this TSA.

In addition to the factors described above, the deciduous timber supply is one additional factor influencing overall timber supply in the Kamloops TSA. Analysis work completed by Ainsworth Lumber Co. Ltd. conservatively estimates that there are over 11 000 hectares of additional deciduous-dominated stands outside PA 16 after taking into account operability and constraints for other forest resources. Assuming a 50-year harvesting age for these stands, and 150 cubic metres per hectare volume at harvest, these deciduous stands could produce an annual harvest level of over 30 000 cubic metres. However, I note that district staff have concerns about: the long-term management strategies for these areas; volume estimates for these stands; and the adjacency implications of harvesting deciduous-leading stands. Based on my considerations discussed under *deciduous forest types*, I conclude that it is feasible to establish a 20 000-cubic metre per year partition for deciduous stands outside the current boundary of PA 16 in the Kamloops TSA. This decision is based on a conservative estimate and I recognize the possibility of even further increases if there is demonstrated performance and after the establishment of silvicultural regimes for deciduous species is clarified. My conclusion is fortified by the fact that there is significant deciduous volume available within coniferous-dominated stands. I encourage district staff to ensure that licences for harvesting deciduous-leading stands are not issued until they are satisfied that the deciduous component within coniferous-dominated stands is being utilized at an appropriate level.

In consideration of all the information provided, I am confident that short-term timber supply in the Kamloops TSA can be maintained. I believe that an appropriate harvest level for the Kamloops TSA in this determination is 2 682 770 cubic metres per year. The current AAC has an existing partition of 200 000 cubic metres for cedar and hemlock stands, and an existing partition of 86 000 cubic metres for PA 16. Based on my considerations discussed under *old cedar and hemlock stands* and *Pulpwood Agreements*, respectively, I will also partition this same amount of volume in this determination to these stands. In addition, this determination includes a new partition of 20 000 cubic metres for deciduous species outside the current boundary of PA 16, and accounts for the volume issued to woodlots since the last determination.

Adams Lake IFPA

Section 59.1 of the *Forest Act* enables the regional manager to increase the annual cut of replaceable licences associated with an innovative forestry practices agreement. Prior to such an increase, the regional manager must have approved a forestry plan in which the innovative forestry practices or activities are identified. Further, the increase must be justified based on timber supply analysis methodology approved by the chief forester.

For the Adams Lake IFPA, the agreement holders completed an analysis to demonstrate the timber supply implications of innovative forestry practices and activities. The main innovation identified in the IFPA analysis related to improved site productivity information, as discussed above under *site productivity estimates*.

The regional manager carefully considered the IFPA analysis, examining each of the factors influencing timber supply availability and associated uncertainties. Based on these considerations, the regional manager determined that 14 870 cubic metres per year is available from within the Adams Lake IFPA boundaries that would not have been known or

made available within the current allowable annual cut for the Kamloops TSA. As I have indicated above, this additional volume is mainly attributable to increased site productivity estimates. I have accounted for the regional manager's determination in my determination for the AAC for the Kamloops TSA as a whole.

I note that as discussed under "Alternative rates of harvest", harvest levels could be increased by as much as 15 percent for the next decade without jeopardizing long-term harvest levels. Therefore, I am satisfied that even if the innovative practices and activities associated with the IFPA are not realized, the long-term timber supply of the Kamloops TSA will not be at risk. Accordingly, I conclude that it is appropriate to include within the AAC an additional 14 870 cubic metres per year to account for the regional manager's decision regarding the additional timber supply attributable to innovative forest practices and activities within the boundaries of the Adams Lake IFPA.

Determination

I have considered and reviewed all the factors as documented above, including the risks and uncertainties of the information provided. It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, that reflects current management practices as well as the socio-economic objectives of the Crown, can be best achieved in the Kamloops TSA by establishing an AAC of 2 682 770 cubic metres, effective January 1, 2003. This AAC excludes the area and volume issued to woodlot licences since the previous determination.

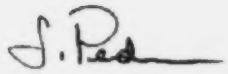
This AAC includes: a new partition of 20 000 cubic metres for deciduous species outside the current boundary of PA 16; and maintains the existing partitions of 200 000 cubic metres for old cedar and hemlock stands, and the partition of 86 000 cubic metres for PA 16. This AAC also includes 14 870 cubic metres per year attributable to innovative practices and activities within the Adams Lake IFPA area.

If additional significant new information is made available to me, or major changes occur in the management assumptions upon which I have predicated this decision, then I am prepared to revisit this determination sooner the five years.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage BCFS staff to undertake the tasks and studies noted below that I have also mentioned in the appropriate sections of this rationale document. I recognize that the ability of staff to undertake these projects is dependent on available staff resource time and funding. These projects are, however, important to help reduce the risk and uncertainty associated with key factors that affect the timber supply in the Kamloops TSA. I recommend that district staff:

- continue to monitor impediments to regeneration and adjusting forest management practices to address survival in high elevation cold sites;
- work with licensees to develop a long-term forest management plan for deciduous-dominated sites;
- ascertain retention levels and clarify long-term management intentions where the clear cut with reserves silvicultural system is used and determine the impact of shading in systems with retention;
- gather data to assess decay, waste and breakage in cedar and hemlock stands;
- collect data on the size of wildlife tree patches;
- examine the contribution of forests within Wells Gray Provincial Park to landscape-level biodiversity requirements;
- work to establish wildlife habitat areas and implement general wildlife measures for identified wildlife;
- monitor mountain pine beetle infestation levels and salvaging activities;
- review harvesting activities in E1 areas and interpret and incorporate Terrain Stability Mapping into future timber supply analysis;
- review road right-of-way widths within the TSA and determine the extent of landing and trail rehabilitation;
- work with the Ministry of Sustainable Resource Management to complete VRI work in the TSA to assess the reliability of existing stand volume estimates; and
- Consider the use of spatial techniques to assess the operational benefits associated with managing for large-size blocks and patch size distribution.



Larry Pedersen
Chief Forester

August 13, 2002

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the Forest Act, Revised Statutes of British Columbia 1996, reads as follows:

Allowable annual cut

8. (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest areas and woodlot licence areas, and

(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or

(b) amends or enters into a tree farm licence to accomplish the result set out under section 39 (1) (a) to (d),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and

(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and

(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to

(a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and

(b) different types of timber and terrain in different parts of private land within a tree farm licence area.

(c) [Repealed 1999-10-1.]

(6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.

(7) The regional manager or the regional manager's designate must determine a rate of timber harvesting for each community forest agreement area, in accordance with

(a) the community forest agreement, and

(b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

(iii) silvicultural treatments to be applied to the area,

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

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Appendix 2: Section 4 of the *Ministry of Forests Act*

Section 4 of the *Ministry of Forests Act* (consolidated 1988) reads as follows:

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to

   (a) encourage maximum productivity of the forest and range resources in British Columbia;

   (b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;

   (c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;

   (d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia; and

   (e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Documents attached:

Appendix 3: Minister of Forests' letter of July 28, 1994

Appendix 4: Minister of Forests' memo of February 26, 1996

Appendix 5: Summary of Public Input

File: 10100-01

JUL 28 1994

John Cuthbert
Chief Forester
Ministry of Forests
595 Pandora Avenue
Victoria, British Columbia
V8W 3E7

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the clear responsibility for determining Allowable Annual Cuts, decisions with far-reaching implications for the province's economy. The *Forest Act* provides that you consider the social and economic objectives of the Crown, as expressed by me, in making these determinations. The purpose of this letter is to provide this information to you.

The social and economic objectives expressed below should be considered in conjunction with environmental considerations as reflected in the Forest Practices Code, which requires recognition and better protection of non-timber values such as biodiversity, wildlife and water quality.

The government's general social and economic objectives for the forest sector are made clear in the goals of the Forest Renewal Program. In relation to the Allowable Annual Cut determinations you must make, I would emphasize the particular importance the government attaches to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests.

Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.

.../2

Province of
British Columbia

Minister of
Forests

Parliament Buildings
Victoria, British Columbia
V8V 1X4

In addition to the provincial perspective, you should also consider important local social and economic objectives that may be derived from the public input on the Timber Supply Review discussion papers where these are consistent with the government's broader objectives.

Finally, I would note that improving economic conditions may make it possible to harvest timber which has typically not been used in the past. For example, use of wood from commercial thinnings and previously uneconomic areas may assist in maintaining harvests without violating forest practices constraints. I urge you to consider all available vehicles, such as partitioned cuts, which could provide the forest industry with the opportunity and incentive to demonstrate their ability to utilize such timber resources.

Yours truly,

Andrew Petter
Minister

Province of British Columbia
Ministry of Forests
OFFICE OF THE MINISTER

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

Re: The Crown's Economic And Social Objectives Regarding Visual Resources

Further to my letter of July 29, 1994, to your predecessor, wherein I expressed the economic and social objectives of the Crown in accordance with Section 7 of the *Forest Act*, I would like to elaborate upon these objectives as they relate to visual resources.

British Columbia's scenic landscapes are a part of its heritage and a resource base underlying much of its tourism industry. They also provide timber supplies that are of significant economic and social importance to forest industry dependent communities.

Accordingly, one of the Crown's objectives is to ensure an appropriate balance within timber supply areas and tree farm licence areas between protecting visual resources and minimizing the impact of such protection measures on timber supplies.

As you know, I have directed that the policy on management of scenic landscapes should be modified in light of the beneficial effects of the Forest Practices Code. In general, the new policy should ensure that establishment and administration of visual quality objectives is less restrictive on timber harvesting. This change is possible because alternative harvesting approaches as well as overall improvement in forest practices will result in reduced detrimental impacts on visually sensitive areas. Also, I anticipate that the Forest Practices Code will lead to a greater public awareness that forest harvesting is being conducted in a responsible, environmentally sound manner, and therefore to a decreased public reaction to its visible effects on the landscape. In relation to the Allowable Annual Cuts determinations that you make, please consider the effects that the new policy will have in each Timber Supply Area and Tree Farm Licence.

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In keeping with my earlier letter, I would re-emphasize the Crown's objectives to ensure community stability and minimize adjustment costs as the forest sector moves to more value-based management. I believe that the appropriate balance between timber and visual resources will be achieved if decisions are made consistent with the ministry's February 1996 report *The Forest Practices Code: Timber Supply Analysis*.

Finally, in my previous letter I had asked that local economic and social objectives be considered. Please ensure that local views on the balance between timber and visual resources are taken into account within the context of government's broader objectives.

Andrew Petter
Minister of Forests

Kamloops Timber Supply Area
Timber Supply Review

Summary of Public Input

BC Ministry of Forests

Kamloops Forest District
1265 Dalhousie Drive
Kamloops, BC V2C 5Z5

Clearwater Forest District
Box 4501 RR2
Clearwater, BC V0E 1N0

August, 2002

This is a summary of the public input received on the Timber Supply Review in the Kamloops Timber Supply Area. This summary does not assess the feasibility or validity of the input or whether it relates to the clearly defined mandate of the chief forester in the allowable annual cut determination.

Kamloops Timber Supply Area

Background

As part of the review of timber supply in the Kamloops Timber Supply Area (TSA), two opportunities were provided for public input. The first followed release of the Kamloops TSA *Data Package* and *Information Report* in November 1998. The *Information Report* was a non-technical summary of the draft data and management assumptions that were to be applied in reviewing the timber supply for the Kamloops TSA. A 30-day review period, ending December 11, 1998, was provided for the public to comment on these documents.

On July 12, 2001, the British Columbia Forest Service released the *2001 Kamloops Timber Supply Area Analysis Report* and *Public Discussion Paper*. The public was encouraged to review and comment on the accuracy of the information in these documents and to provide additional information during the 60-day review period that ended September 11, 2001.

This report summarizes the input received during both public review periods. This information was provided to the chief forester for his consideration when he reviewed the allowable annual cut (AAC) for the Kamloops TSA. The first section of this summary outlines the public review process implemented by the Forest Service, and describes the types of public input received. The second section summarizes the public input in sufficient detail to indicate the range of input received. The original submissions (with personal identifiers removed in accordance with the *Freedom of Information and Protection of Privacy Act*) can be reviewed at the Clearwater Forest District office in Clearwater and the Kamloops Forest District office in Kamloops.

Public Review Process and Response

Staff from the two forest districts in the TSA, as well as Kamloops regional staff, actively solicited public input on the Timber Supply Review in the Kamloops TSA through the following actions:

- more than a hundred copies of the *Data Package, Information Report, Analysis Report* and *Public Discussion Paper* were mailed to stakeholders in the TSA, including First Nations, licensees, local governments and environmental groups. Meetings or presentations were offered.
- the *Data Package* and *Analysis Report* were available at the two district offices and the Kamloops regional office in Kamloops. About 40 copies of the documents were picked up or mailed out.
- newspaper advertisements were placed, advising of the availability of all documents for review by the public.
- copies of all the documents were made available to the local media. Interviews were conducted with the local radio and newspaper.
- a meeting regarding the *Data Package* was held with TSA licensees on January 11, 1999, and periodic meetings with them have occurred since that time.
- the releases of the *Data Package* and *Analysis Report* were discussed at 17 Local Resource Use Plan meetings and further in-depth reviews were offered. No requests were received.
- local politicians were briefed on both documents.
- referrals were made to the Ministry of Forests website where documents were available to download.

The forest district and regional offices received 11 written submissions on the *Data Package* and 10 submissions on the *Analysis Report* (see Appendix 1).

Public Input

In this section, public input on the information presented in the Timber Supply Review documents for the Kamloops TSA is summarized under the following headings:

- Data Package (and Information Report)
- Timber Supply Area Analysis Report (and Public Discussion Paper)
- Other comments

Data Package

Land Base Factors
Two forest industry submissions question whether the areas proposed under Goal 2 of the Protected Areas Strategy are removed from the land base.

The Weyerhaeuser submission (on behalf of the TSA Committee, which includes the Shuswap Nation and other licensees) says the current operability lines are dated and need to be reviewed prior to evaluating biodiversity impacts.

The Shuswap Environmental Action Society (SEAS) and the Yellowhead Ecological Association (YEA) note that Table 16 shows how little cedar-hemlock has been logged since the last determination when these stands were added back into the operable land base. If they are not being logged, the groups say these stands should be removed; otherwise their inclusion increases pressure on the rest of the land base. These types have high ecological values as old-growth forests and should remain unlogged if possible, according to these submissions. They add that there is little benefit to anyone to force companies to log uneconomic timber.

YEA and SEAS say any deferred areas should be removed from the land base now and added back in the next Timber Supply Review if a decision is made to include them. YEA says the Vavenby pine forest, Mount Olie and the Cook Creek protected areas need to be deferred because the Kamloops Land and Resource Management Plan (LRMP) recommended some protection of these areas.

Environmentally Sensitive Areas
The submission from BC Environment says the *Data Package* should clarify that Environmentally Sensitive Areas (ESAs) are to be phased out and/or replaced by new and better data from fieldwork. The agency also says that ESAs cannot all be assumed to be inoperable for long, given technological changes in milling and harvesting. This leads to a concern that previously undisturbed wildlife habitat types may be logged, complicating habitat management, according to BC Environment.

The Weyerhaeuser submission says the Forest Practices Code and the Kamloops LRMP eliminated the need for both recreation and water ESAs. The company questions what terrain hazard data is available and what mapping has been done of harvesting in ESA1 and ESA2 classifications (high and moderate sensitivity, respectively).

SEAS and YEA say terrain stability maps should be added to the data base, replacing Es1 and Es2 mapping, since they are more accurate. They also question why there are no reductions for Es2 (moderate soil sensitivity) areas, noting that other TSAs have used a partial netdown. YEA expresses concern about the inclusion of all ESA2 areas in the timber harvesting land base (THLB), noting that climate change, clearcutting, landslides, flooding and stream channel changes can all remove these sites from the THLB or change them to ESA1.

Currently Unharvested Forest Types
Weyerhaeuser questions the criteria used to exclude some of these types from the THLB:

- the criterion of a site index less than or equal to eight should only apply to stands younger than 80 years.

- licensees are now harvesting in older balsam-spruce stands with a crown closure of 26-35 percent. The criterion should be revised to 25 percent crown closure or less.

Pulpwood Agreement 16 Stand Types
Four forest industry submissions comment on the definition of stands contributing to Pulpwood Agreement (PA) 16. Their comments include:

- the re-definition of these stands seriously erodes the short- and long-term timber supply by eroding the contributing land base by about 50 percent.
- the original 1981 PA definition should be used, as it has been in other TSAs, or the criteria should be negotiated and finalized by Ainsworth Lumber Co. and the Ministry of Forests.
- whatever the definition, a minimum of 55 percent of the allocation to PA16 must be from within the Kamloops Forest Region. This contribution must not be reduced unilaterally, creating increased pressure in other areas.

SEAS and YEA say if no harvesting is occurring, the marginal timber inside PA16 should be excluded from the cut.

Roads, Trails and Landings
Tolko questions why the estimate for future roads, trails and landings is 7.4 percent when the estimate for existing ones is only 5.9 percent. Weyerhaeuser asks to review the data used to arrive at these estimates and questions how the current practice of rehabilitation and/or planting of roads is incorporated.

Forest Inventory
SEAS and YEA note that the results of recent inventory audits are not included, and say any results of volume-ratio sampling should be incorporated. The groups say that since companies regularly log the highest volume stands first, it follows that the remaining stands should have less volume per hectare and this should be reflected in the analysis.

Expected Rate of Growth
YEA says the growth intercept method of estimating site productivity should not be used when plantations are artificial, of a single species, or consist of species with historical health problems.

SEAS and YEA question the source of the operational adjustment factors used in Table 18, and ask why they aren't larger in older harvested blocks to reflect less stringent stocking control and greater soil degradation that occurred pre-Forest Practices Code.

YEA says volume projections should consider not only density, species and the number of free-growing trees but also rates of pest and disease damage, and provides examples. The group identifies other impacts that should also be considered, including increased windthrow and sunscald at the edges of most clearcuts, climate change inducing more frequent and severe thunderstorms, high frequency of wildfire in some types, and avalanching and snow creep on steep clearcuts.

Minimum Harvestable Age
YEA says the minimum harvestable age (MHA) should generally be based on culmination age not on a minimum of 81 years. The group says the concept of an ecological rotation is based on extensive studies of nutrient cycling in BC forests; this approach is consistent with the LRMP and should be used in the timber supply analysis.

Weyerhaeuser says stands should become eligible for harvest when they meet the minimum age or volume requirement. The company also suggests dropping the MHA for most types to 70 years.

Regeneration and Silvicultural Factors
Weyerhaeuser suggests reducing the regeneration delay for several analysis units to two years.

SEAS and YEA question the assumption that backlog not satisfactorily restocked (NSR) areas will be restocked by the year 2000, given decreases in funding to Forest Renewal BC and the Ministry of Forests. YEA also says a portion of the backlog will not become free-growing with preferred species, due to inappropriate use of mechanical site preparation and planting (details provided).

Weyerhaeuser says figures for current NSR should not be considered in the analysis, as the regeneration delay component of the yield curve covers this factor. Areas designated current NSR should be assigned yield curves effective from the date of harvest, according to the company.

SEAS and YEA question why silvicultural systems in the *Data Package* do not include uneven-aged stands, even though selection systems are used extensively in the Kamloops Forest District and the last AAC determination recommended inclusion of this type of management in future Timber Supply Reviews.

Harvest Sequence
YEA says the rationale for giving harvest priority to old forests is not explained or justified. This assumption is unsound, YEA says, because, according to the *Biodiversity Guidebook*, old seral forests in landscape units with intermediate and high biodiversity emphasis are to meet certain objectives.

Visual Quality
SEAS and YEA say the green-up heights seem far too short to effectively provide visual green-up. YEA adds there are no published attitude surveys that support these heights (see USDA and Nelson Region studies), and the LRMP guidelines were intended to introduce more retention and the use of selection silviculture to meet visual quality objectives (VQOs).

Weyerhaeuser requests more information on visual management, and says the lake management buffer VQO is limited to the portion of the 200-metre zone that is visible from the designated key viewpoints, so harvest requirements should only apply to that portion.

Recreation and Cultural Heritage
The Kamloops Naturalist Club says an assessment is needed of the different types of recreation currently available and how they could be expanded without being impinged upon by logging operations. The group says considerable potential exists for fishing camps and other types of back-country recreation.

Weyerhaeuser says a sensitivity analysis should be done using the current cultural heritage data and/or traditional use studies.

Riparian Management
BC Environment questions how lakes and small streams are handled in Table 10 (estimates for riparian reserve and management zones), and asks for clarification.

Weyerhaeuser suggests changes to S4 classifications and says applying 10-metre reserves to smaller wetlands is not current practice or a Code requirement. The company says the basal area retentions noted for riparian management zones (Table 10) are maximums, and actual practice ranges from zero to these maximums.

Watershed Management
The Kamloops Naturalist Club says the protection of watersheds is extremely important, for local users and the overall functioning of these ecosystems. The club says studies are needed on the impact on the Thompson River system of water runoff from clearcuts after heavy snowpacks and a rapid spring runoff.

Weyerhaeuser says community watersheds do not have a 20 percent equivalent clearcut area (ECA) restriction; they say that threshold triggers further analysis which can permit further harvesting. The company says a

30 percent ECA restriction would be more realistic.

SEAS and YEA make several comments about watershed management, including:

- ECA constraints for high value fisheries watersheds should also be modeled. Suggest using 25 percent ECA.
- watershed ECA constraints should be modeled for domestic and irrigation watersheds that are not legal community watersheds.
- work by Dave Toews (Ministry of Forests, Nelson) has shown that nine metres is likely insufficient for hydrological green-up.
- it's unclear how 20 percent ECA less than nine metres in height above the H60 line translates to ECA 25.2 percent less than 6.6 metres in the watershed overall. Modeling 20 percent less than nine metres in the whole watershed is likely closer in impact to what will be implemented on the ground, and accounts for other potential soil and terrain constraints.
- the 20 percent ECA criterion has a scientific justification; increased discharge occurs when the ECA reaches this level.

Wildlife Tree Patches

BC Environment says that using wildlife trees and wildlife tree patches (WTPs) may be a reasonable attempt to model current practices, but it doesn't account for the reduction in these stand level requirements that will occur when old growth management areas (OGMAs) are finalized in the next few years. This submission says the reduction in WTPs is important since it will allow more OGMAs to be established within the four percent impact cap set by the Kamloops LRMP. A note of caution on this point is needed, according to BC Environment.

Wildlife Management

BC Environment says the use of 150 years as the minimum mature cover age for caribou habitat management is, according to the Kamloops LRMP, only acceptable if it can be shown that adequate habitat containing caribou attributes would be left after logging of the second pass. Weyerhaeuser says 150 years is the harvest age not the minimum age for mature cover. The latter is a function of old-growth attributes (arboreal lichens) and 120 years is more appropriate, according to the company.

The Kamloops Naturalist Club says a complete inventory of both wildlife and their habitats is necessary, along with an outline of steps necessary to protect them during logging and road construction.

BC Environment says the regeneration assumptions in the *Data Package* signify significant tree species conversion and do not account for the following risks to wildlife biodiversity:

- removal of fir and cedar from stands eliminates a key nesting tree, a deer food source and a source of coarse woody debris.
- balsam and hemlock provide live snag features earlier than the species replacing them.
- conversion to monoculture increases the risk of epidemic disease and large fires.
- global warming might suggest a preference for drought tolerant species.
- wildlife habitat management zones and deer winter ranges have plans based on a continued mix of tree species.

BC Environment says broad-scale tree species conversion, including introduction of species like larch and hybrid poplar, is a high risk strategy for wildlife biodiversity. Modeling this conversion as a sensitivity would clarify whether it is being used to raise the long-term harvest level and also help to measure its costs to wildlife.

YEA says the LRMP-approved critical deer areas need to be revised as a result of expanding deer populations and changes in the location and condition of critical habitat. The group says the presence of critical moose and grizzly bear habitat where well known should be accounted for in the analysis, as this habitat

requires sensitive management.

Landscape Level Biodiversity
SEAS and YEA make several comments on the assumptions used to model landscape level biodiversity, including:

- what is the source of forest cover data for parks and is it reliable?
- how can type identity 8 areas (no typing available) contribute to biodiversity requirements?
- it's unclear how WTPs can contribute to seral-stage requirements. Because they are small in size, they're unlikely to contain interior forest conditions.
- significant unsalvaged losses are likely to occur in the inoperable and protected areas that contribute to biodiversity. At a minimum, a sensitivity run is needed to examine the potential impact of stand-replacing events in the inoperable. It's unclear if the model grows stands in the inoperable forever.
- protected areas are not being used correctly to contribute to biodiversity seral stage requirements. If they are to be counted, then the old-seral requirements (Table 22) should be increased to compensate for the fact that these requirements are based on the assumption of 12 percent old growth in protected areas. See the *Biodiversity Guidebook*.

First Nations
In the first of two submissions from the Shuswap Nation Tribal Council, Chief Arthur Manuel raises two main concerns:

- given the current gaps in information regarding cultural resources, traditional uses and wildlife inventory, it will not be possible to manage for and protect Secwepemc interests. Determination of an AAC without consultation will infringe upon their title and rights and may be the subject of compensation claims.
- due to the failure to consider the Delgamuukw decision in the Timber Supply Review process, the tribal council must oppose it. Resource allocation decisions in the absence of proper consultation and the informed consent of the tribal council will be treated as a breach of the Crown's fiduciary duty, and will be contested as such.

In this submission, Chief Manuel requests a meeting to discuss their priorities and concerns, and says they need funding to deal with these issues and they are prepared to submit a budget.

A second submission from the Shuswap Nation Tribal Council notes the lack of complete resource inventory and traditional use data, and says the province has a duty to consult with First Nations on issues of infringement of aboriginal rights and title. This submission also says an analysis focused and based on large-scale timber extraction is a narrow approach.

Unsalvaged Losses
Weyerhaeuser says the volume losses assigned to defoliators must be substantially reduced because the hemlock looper losses in the North Thompson are limited to partitioned cedar-hemlock stands and are part of the harvest profile there. As well, the company says the volume left in reserves from the Frogmoore Fire should not be considered unsalvaged losses but should be attributed to the biodiversity analysis impact.

SEAS and YEA make three comments on this topic:

- losses in plantations that have been partly or completely destroyed by weevils and root rot should be reflected in the long-term timber supply.
- there is no indication of the overall impact of root disease, although this was identified in the last AAC determination as an issue requiring study.
- recommend a sensitivity analysis on the effects of climate change, as recent fires and increased insect infestations are already having an impact.

Timber Supply Area Analysis Report

Pulpwood Agreement 16
A submission from Ainsworth Lumber Co. says they are part of a working group within the Kamloops and Cariboo forest regions to clarify management issues for Pulpwood Agreement 16, and ask that the issue of apportionment be considered in this timber supply analysis. On a regional level, the company recommends a 45/55 split between the Kamloops and Cariboo regions respectively, based mainly on timber availability shortfalls in the Lillooet TSA. On the issue of TSA apportionment, Ainsworth proposes an increase in the allocation for the Kamloops TSA from 86,000 cubic metres to 125,000 cubic metres, due to the stable timber supply.

Cedar-Hemlock Partition
Two forest industry submissions comment on the cedar-hemlock partition. Gilbert Smith Forest Products expresses concern about the future of their non-replaceable forest licence, saying this partition licence has been their mainstay. The company says they have operated successfully in cedar-hemlock stands for the last 34 years and have put these stands back into the timber supply, and they are deeply disturbed by the absence of any helpful direction in the *Analysis Report* regarding the future of their company.

Meeker Log and Timber says the cedar-hemlock partition forest licence provides the only secure fibre for their plant in Kamloops. The company is confident suitable fibre will remain at the end of the current licence term, and asks that the chief forester apportion that volume in a seamless manner for operations currently holding a partition forest licence. The company also notes that the 1996 *AAC Rationale* anticipated that harvest of old cedar-hemlock types could help control the level of insect infestation and asks if this benefit was incorporated into the analysis.

Deciduous Forest Types
In a second submission, Ainsworth Forest Products expresses interest in unallocated deciduous-leading timber on conventional operable ground in the Kamloops TSA, noting these stands are currently excluded from the harvesting land base. The company provides details of a planning exercise that identified about 22,000 hectares of deciduous-leading stands, half of which are currently available for harvesting. Ainsworth says the majority of the volume would be used at their OSB plant in 100 Mile House, but higher quality logs would be sold to other users, thus maximizing full log profile utilization. The company also says harvesting and reforesting will increase biodiversity and the amount and diversity of wildlife habitat.

Roads, Trails and Landings
An individual submission expresses concern about the vastly increased area projected for roads, noting various problems associated with roads (erosion of wildlife habitat, increased vehicle access, spread of noxious weeds, and disruptions to hydrological processes). This individual says that although he dislikes clearcuts, he would favour larger ones if it meant fewer roads.

Site Productivity
Meeker Log and Timber's submission refers to Table 4 (Average analysis unit site index based on forest inventory and OGSI information) and questions the significance of increasing the site index for old-growth stands up to the date of harvest and then projecting growth at the lower inventory site index rate. The company asks if this pre/post harvest variance skews the assumed contribution to the AAC from harvesting old cedar-hemlock stands.

Silvicultural Systems
The licensees' submission (from Bell Pole, Riverside, Smith, Tolko and Weyerhaeuser) questions the rationale for increasing selection harvesting from 1800 cubic metres per year to 4900 cubic metres per year.

Visual Quality
An individual submission expresses the opinion that it is dishonest to engage in "viewscaping," saying he sees no reason why tourists and residents should be sheltered from the ugliness of clearcuts and other logging practices.

Riparian Management
The Department of Fisheries and Oceans (DFO) expresses concern that the netdown for riparian areas may not reflect the retention required to protect stream ecosystems, particularly small fish-bearing streams and direct tributaries. In order to ensure protection of fish habitat, DFO has previously recommended that retention should approach 100 percent within the riparian management zones of S4 streams and of S5 and S6 streams that are directly tributary to fish-bearing streams.

The submission from the Skeetchestn Indian Band expresses full support for DFO's recommendations and asks how these will be accommodated in the timber supply analysis. The band says they are opposed to clearcut harvesting within 100 metres of any riparian feature and strongly opposed to any harvesting whatsoever within 20 metres of any riparian feature. The band recommends that a maximum of 50 percent of the volume within 100 metres of any riparian feature (including all S6 streams and all wetlands) be harvested in a single pass, in order to protect hydrologic function and the fishery.

The submission from BC Environment suggests that confusion arising from the wording of the *Riparian Management Guidebook* has resulted in the percentages for volume retention in riparian management zones being underestimated by half. The agency provides an analysis that demonstrates the riparian impact was under-represented by 17 percent, leading to the need to reduce the timber harvesting land base by 3703 hectares. BC Environment strongly suggests this downward pressure on timber supply be corrected.

Wildlife Protection
In the absence of federal or provincial legislation for habitat preservation for endangered species, an individual submission says that OGMAs and WTPs must be implemented to the fullest. This individual expresses concern that the 11 percent increase in the AAC in 1996 means that habitat protection has been compromised already and will be further threatened following this Timber Supply Review.

Landscape Biodiversity
The licensees make several comments on this topic:

- what is the purpose of assuming that stands older than 250 years in the non-timber harvesting land base (NTHLB) were 250 years old at the start of the analysis?
- landscape biodiversity objectives are specified by the *Biodiversity Guidebook* (subject to timber supply impacts) and not by the *Landscape Unit Planning Guide.*
- the assumption of no disturbance in the NTHLB over time (Figure 14) does not reflect the reality that stand-replacing events will occur there. It is more realistic to assume that the current NTHLB age class distribution reflects what will occur over time. This is a key element in modeling old-seral requirements.
- for the purposes of modeling, basal area retention targets in riparian management zone were converted to reserves, but these equivalent reserve areas should not be considered to meet old-seral requirements.

The submission from Gilbert Smith Forest Products says there has never been a rationale justification for applying biodiversity guidelines to all parts of the TSA. The company says adequate provision can be made if the TSA is considered as a unit and adjustments are made for the contribution of non-commercial types and parks. The company says the harvest will have to be reduced 15 to

20 percent generally, and even more in cedar-hemlock types, if the regulations are implemented as written.

BC Environment recommends that any source of uplift to the AAC (e.g., use of OGSI, continuation of the cedar-hemlock partition, changes in operational adjustment factors) be examined carefully for adverse effects on biodiversity requirements (full old and mature seral retention, wildlife tree retention). The agency says that right now the provisions of the *Biodiversity Guidebook* can be fully implemented while meeting the timber supply impact specified in the Higher Level Plan.

With regard to proposed stand conversions (balsam, cedar and hemlock to spruce, fir and pine), BC Environment says these conversions reduce the recruitment of suitable wildlife trees in stands and limit the creation of OGMAs where they are dynamic on the landscape. The agency says the Higher Level Plan refers to retention of the diversity of forest tree species and asks how this concern is accounted for in the analysis, noting this is likely a downward pressure on timber supply.

Other Comments

Many submissions comment on factors or issues other than those specifically covered by Timber Supply Review documents. These comments are summarized in this section.

Timber Supply Review Process

The Kamloops Naturalist Club says the process must be more transparent and expresses the opinion that too much emphasis is placed on the loss of logging jobs rather than on opportunities from intensive forest practices and jobs from other forest values. The club says a spatial analysis is needed, as well as GIS mapping, and that the AAC determination and forest management must be based on small sustained yield units to allow the process to be more sensitive to local conditions and to promote economic stability.

BC Environment says the use of the term "current" is confusing unless it is defined. The agency strongly recommends it be given a start date, such as December 1997.

SEAS and YEA identify several areas that are missed from the list of special resource management zones (Table 1 of the *Data Package*). As well, YEA says a new category should be identified for problem forests where events such as frequent wildfires, regeneration problems, avalanching, pest damage and windthrow are found to be historically high after previous silvicultural activities.

Weyerhaeuser (on behalf of the TSA Committee, which includes other licensees and the Shuswap Nation Tribal Council) poses numerous questions about analysis unit definitions, the application of yield curves, and many other topics.

An individual says some adjustments should be made for the future effects of climate change.

BC Environment notes significant improvements in clarity and readability of analysis reports, but says there is still room for improvement in converting the implications of sensitivity analyses into a picture of future impacts on timber supply and on biodiversity and habitat issues. The agency provides a list of concerns for biodiversity and habitat for the next Timber Supply Review, given indications in the *Analysis Report* of sources of future upward pressure on the AAC.

Management Practices and Tenures

The Kamloops Naturalist Club says silvicultural systems must be expanded to include more intensive practices of harvesting, not just extensive clearcutting. The club also says the TSA should be managed as two separate units, one for each forest district, to increase efficiency and accountability. The club also says more timber should be available to value-added operations and recommends

operation of a log market, such as in the Vernon Forest District.

An individual submission says greater efforts must be directed to biological control and other forms of management to control the mountain pine beetle, as it is unlikely that sufficiently cold winters to decimate the population will occur and we cannot continue to mow down pine forests ad infinitum.

A submission from Bondar Forest Planning Inc., on behalf of Caverhill Lodge, outlines a proposal for a fixed area tenure to manage the important lake area around the lodge on a sensitive and sustainable basis. According to this submission, the proposed tenure would be similar to a Community Forest Licence, but would include management responsibility for other resources such as wildlife, fisheries, water and range. While acknowledging the forest district does not have the authority to issue such a licence, this submission says the proposed licence fits with many other government initiatives and is part of the solution for the Provincial Review currently underway. The company also says this tenure would assist with negotiations regarding softwood lumber tariffs as this timber would become part of an open log market.

Harvest Levels

BC Environment says any increase in the AAC comes at a cost to biodiversity and riparian protection, and should not be supported.

Appendix 1

Submissions received by the Kamloops and Clearwater Forest Districts

Submissions received on the Data Package

First Nations
Shuswap Nation Tribal Council (two submissions, Dec. 1, 1998, and Jan. 6, 1999)

Government agencies
B.C. Environment

Forest industry
Weyerhaeuser Canada (on behalf of some licensees and the Shuswap Nation Tribal Council)
Williams Lake TSA Association
Ainsworth Lumber Co. Ltd.
100 Mile House TSR Licensees Working Group
Tolko Industries Ltd.

Interest groups
Yellowhead Ecological Association
Shuswap Environmental Action Society
Kamloops Naturalist Club

Submissions received on the Timber Supply Analysis Report

First Nations
Skeetchestn Indian Band

Government agencies
BC Environment
Fisheries and Oceans, Habitat Enhancement

Forest industry
Ainsworth Lumber Co. (two submissions, July 25 and Oct. 3, 2001)
Weyerhaeuser Co. Ltd. (on behalf of Bell Pole, Riverside, Smith, Tolko and Weyerhaeuser)
Gilbert Smith Forest Products Ltd.
Meeker Log and Timber

General public
Two individual submissions